RAILROAD GAZETTE

FRIDAY, AUGUST 20.

Life and Profits of a Car.

[Paper read by E. C. Spalding, of the Western & Atlantic Railroad, at the Car Accountants' Convention at Buffalo.]

This is a very important subject, and one which has been somewhat neglected. When we consider the cost of equipping a road with cars, the expense to keep them in repairs, and mileage earned, we at once have three very important subjects which involve an enormous amount of capital. An investigation of the subject cannot fail to be interesting, and we will find some important suggestions presented during our examination. Taking the value of a car as a basis, its mileage as revenue or profit, and the repairs as expense, we are sometimes astonished at the vastness of the interests intrusted to our care. A car will cost, on an average, $500. A road owning 1,000 will have invested $500,000; a road operating 10,000 will expend $5,000,000 in equipping itself, etc. During 1882 our management required me to keep an individual mileage record of each car, and, as we were then in the South interchanging daily reports of movements and mileage, I was able to compile my tables from actual figures and not estimates. A road, as we before mentioned, secures its cars at an immense expense. These cars are then turned loose upon the country and are expected to earn a reasonable interest on the investment. We see at a glance what an important department in railroads this is. The question then is, what is the revenue and expense involved, and what profit to a railroad is a car? This, of course, depends upon the age and condition of a car. Below I present a table showing the average mileage made by our cars of various ages, also repairs done, thus giving the average revenue, expense and net loss or profit (or original cost) by cars of various ages:

EARNINGS AND COST OF BOX CARS IN GENERAL SERVICE.

Age of car, years	Mileage run.	Money earned.	Cost of repairs.	Net profit.	P c. of profit.
1.....	13,149	$98.62	$9.58	$89.04	18.00
2.....	13 478	101.08	38 13	62.95	12.50
3.....	10.475	78 56	48.24	30.32	6 00
4	9.847	73.85	45.85	28.00	6.00
5	9.881	74 11	57.31	16.80	3.00
6.....	9.349	70.12	70.74	*0.62	*0.11
7.	8.968	67.26	60.74	6.52	1.25
8	9.250	69.37	55 49	13.88	2.80
9...	9.295	69 71	49 80	19.91	4.00
10	7,656	57 42	53.67	3.75	0.75

* Loss.

It will be noticed that for the first five years cars make good mileage, and will average 9 per cent. profit on the investment; but during the next five years the mileage decreases, repairs increase, and the net profit is reduced to an average of 1.6 per cent. This suggests that for the first five years of a car's life it is a good investment, but after that it is not profitable to run them as an investment. For the first five years a car will net 9 per cent. on the investment, or about half pay for itself in mileage; after that it is almost "nip and tuck" between mileage and repairs for the next five years. The life of a car depends altogether upon how long a road is willing to patch it up with repairs. I believe we have an occasional car now in service which was built 20 years ago, but I apprehend that very little of the original cars remain, and that it has been more expensive to keep them up than it would have been to have destroyed them and used the old iron in the construction of new cars. These figures prove, I think, that mileage at the rate of 0¾ cent per mile is not excessive, and results only in a fair profit on the investment.

Track Inspections on the Savannah, Florida & Western.

The Savannah, Florida & Western Company has for some time carried out a complete system of track inspection and of rewards to [supervisors and section foremen, with excellent results. Experience has shown some modifications of the rules to be desirable, and the amended regula ions are given in Order No. 129, issued by General Manager H. S Haines, under date of July 31 last. This order (which applies also to the Charleston & Savannah road, which is under the same management) is as follows:

Rule 124, General Rules No. 2, is amended to read as follows:

I. There will be an annual and two intermediate inspections of the roads, as follows:

II. The annual inspection will be conducted by the Superintendent, assisted by the officers of the Roadway Department, Chief and assistant engineers, and such other persons as he may invite.

III. The intermediate inspections will be conducted by the Master of Roadway, assisted by the officers of the Roadway Department, and such other persons as he may invite.

IV. The annual inspection shall be made in August. The intermediate inspections shall be made in November and April.

V. The annual inspection shall determine the condition of each section and division in the following particulars:

A—LINE.
B—SURFACE.
C—LEVEL.
D—FROGS, SWITCHES AND GUARD RAILS.
E—DRAINAGE.
F—POLICING OR CLEANLINESS OF TRACK OR GROUNDS.

These conditions shall be determined by a system of marking for every mile of road. 10 shall indicate perfection; 0 shall indicate the worst possible condition, and the intermediate numbers shall be used to represent, in a proper ratio, intermediate conditions.

VI. The system of reward and classification for the annual inspection is as follows:

A—The division on the Savannah, Florida & Western Railway showing the highest general average of points in the various conditions noted under Paragraph V. will be rewarded by a premium of $100 to the Supervisor; the second average will be rewarded by a premium of $50 to the Supervisor.

The division on the Charleston & Savannah Railway showing the highest general average of points in the various conditions noted under Paragraph V. will be rewarded by a premium of $50 to the Supervisor.

B—The section on each division showing the highest average of points shall be rewarded by a premium of $40 to the Section Foreman, and the second average by $20. Section foremen to be eligible to these premiums must have been on the same section at least six months previous to date of inspection.

The section-houses and grounds on each division receiving the highest mark shall be rewarded by a premium of $10 to the wife of the section foreman, or to the section foreman, in the event of his not being married.

C—(A)—Sections where the general average is found to be 8 and over shall be classed as first-class; and the foremen of such sections shall be classed as first-class foremen. To be entitled to this classification a section for emanmust have been on the same section at least six months previous to the date of inspection.

B—Sections where the general average is found to be 6 and over, but less than 8, shall be classed as second-class, and the foremen of such sections shall be classed as second-class foremen.

C—Sections where the general average is found to be 4 and over, but less than 6, shall be classed as third-class, and the foremen of such sections shall be classed as third-class foremen.

VII. 1—The intermediate inspections shall determine the same conditions in the same manner as indicated in Paragraph V. of this order.

2—The system of reward and classification for the intermediate inspections is as follows:

A—The classification under C, Paragraph VI., shall be determined, and its provisions carried out at each intermediate inspection.

B—The Foreman of the section showing the most improvement on each division shall be rewarded with a premium of $15, provided he has been on the same section for three consecutive months previous to date of inspection.

C—The Foreman on each division, who has operated his section with the least amount of labor per mile of track, will be given a premium of $10. To be entitled to this premium, a foreman must show a condition of track equal, if first-class, or improved by one point, if second-class, or by two points, if third-class, to that shown by the previous inspection, and he must have served continuously in charge of the same section for at least three months previous to date of inspection.

D—The Foreman of the gang on each division, who has operated his gang with the least expense for tools per man, shall be given a premium of $10.

VIII. A difference of 1 will be allowed in the classification of foremen between iron rail and steel rail track. This difference will not be noted by the inspectors.

General order No. 130, following the above, gives instructions for the guidance of inspectors, and is given in full below:

RULES FOR INSPECTORS ON ANNUAL AND INTERMEDIATE INSPECTIONS.

I. LINE (A)—The Inspector will occupy a position vertically over the rail he is inspecting, and will confine his attention to that rail.

(B)—The requirements for a standard line are found in Section 1, specifications for a standard section. When these requirements are fulfilled, the condition must be represented by 10. True line means straight line on tangents and uniform curvature on curves so far as the eye can detect.

(C)—Continuous and very apparent deviations from the true alignment over the entire length of a mile must be indicated by 5.

(D)—A condition of alignment that would be dangerous for a train to pass must be recorded as 0.

(E)—Conditions intermediate between those described in Sections B, C and D will be indicated in the proper ratio between the numbers representing those conditions.

II. SURFACE (A)—The Inspector must place himself as far on the opposite side of the car from the rail he is inspecting and as near the level of the track as possible, and must inspect only the rail farthest from him.

(B)—The conditions will be noted in the same manner as indicated under B, C, D and E of Rule I., grades corresponding to the tangents, and changes of grades corresponding to curves.

III. LEVEL (A)—The Inspector must place himself near the centre of the car; he must watch the level index, and must also note unusual oscillations of the car.

(B)—If the Inspector can detect no vibration of the index nor oscillation of the car, due to unlevel track on tangents, nor want of uniformity of elevation on curves, he will record the condition as 10.

(C)—If continued vibrations or oscillations, due to irregularities of level on tangents or elevation on curves, are observed over an entire mile, the condition must be recorded as 5.

(D)—If from a defective condition of level or elevation alone it would be dangerous for a train to pass, the condition must be recorded as 0.

(E)—Conditions intermediate between those described in Sections B, C and D of this rule, will be indicated by a number which will represent the proper ratio between those conditions.

IV. FROGS AND SWITCHES (A)—This subject will be divided into the following 10 subdivisions, each entitled, if in the required condition, to a marking 1. (See Section 7, Specifications for a Standard Section and Plans for Standard Main Line and Yard Switches).

Guard Rails.—1. Position—Must be placed exactly as required in the standard specifications.

2. Condition—The guard rail must be of good, smooth iron and braces must not be broken, but must be fully spiked.

Frogs.—3. Position—Must be in proper line with both tracks. (See Section I.).

4. Condition—Must be properly tightened up, and not worn so badly as to cause a jolt.

5. Joints—Must be fully bolted and bolts must be tight.

Switches.—6. Position—Must be in proper line with lead rails when set for siding, and must be placed according to standard plans and specifications.

7. Condition—All parts must be in serviceable condition, and no lost motion allowed.

8. Stand—Must be properly placed and well spiked; lever must work freely.

9. Tie-bars—Must be the full number required by the plans, must be free from friction, and must be well bolted to the switch rails.

10. Castings.—Head blocks, safety castings, guard rail braces and sliding plates must be in good order and properly secured.

(B)—Any condition less than prescribed in the foregoing subdivisions will be represented by such decimal fraction of 1 as it bears to the required standard.

(C)—The sum of markings in each of the subdivisions multiplied by 10 and divided by the number of notations entered will represent the condition of frogs and switches upon each mile.

V. DRAINAGE (A)—Of track will be divided into 10 subdivisions, each of which is entitled, if in the required condition, to a marking 1. (See specifications for standard section, Sections 4 and 6.)

Natural Streams and Surface Ditches.—1. Must be free from drift and other obstructions.

2. Must be regular in direction and grade.

3. Size must be sufficient to pass all water naturally coming to them from the hardest rains.

4. Side slopes of ditches must be sufficient to prevent caving in.

Parallel Drains on Side Ditches.—5. Bottom of side ditches, except in cuts, must be at least 1½ ft. below the level of the bottom of the cross-ties.

6. They must be regular in direction and grade.

7. Size must be sufficient to carry off rapidly all rain falling on the road-bed in the hardest storms.

8. In cuts they must be as shown in standard plan, and along embankments must be made with slopes one and one-half feet horizontal to one foot vertical; the inner edge of such ditches must not be nearer the centre line of track than one and one-half times the height of embankment added to ten feet.

9. They must be free from obstructions.

Ballast.—10. Must be of such a nature as to allow water to pass rapidly through it, or must be so shaped that water will pass rapidly from its surface.

(B)—Any condition less than prescribed in the foregoing subdivisions will be represented by such fraction of 1 as it bears to the required condition.

(C)—The sum of markings in all of the subdivisions upon any mile multiplied by 10 and divided by the number of subdivisions noted will represent the condition of drainage upon each mile.

VI. POLICING (A)—This subject will be divided into 10 subdivisions, each of which, when in the required condition, is entitled to a marking 1. (See specifications for a standard section 8 and 10.)

BUILDINGS.—1. Position—All structures must be placed in accordance with Standard Clearance Diagram rule 46, except those erected prior to June 1, 1885, which must not be nearer than 6 ft. 6 in. from centre of track.

2. Condition—Exterior of section and station buildings and their grounds must be clean and in good repair.

Right of way.—3. Cross-ties and iron must be piled according to the general rules.

4. Bushes and weeds must be kept cut close to the ground within the limits of the right of way; grass must not be allowed higher than the tops of the rails, and must be kept cleared from around telegraph poles; stumps must be removed from within the outer limits of the side ditches, and all logs must be rolled to the outer edge of the clearing of the right of way. Lumber or other obstructions must not be allowed between main line and side tracks.

Road Crossings.—5. Must be in accordance with standard plans and must be kept clean and safe for the passage of animals and vehicles.

Signs.—6. Must be placed in position as required in standard clearance diagram. Post must be plumb and boards level.

Wood Racks.—7. Must be in position prescribed in first section of this rule and must be free from rubbish and in good repair.

8. Turn-outs for hand-cars must be properly maintained as required by general rules.

Water Stations.—9. Must be placed according to the first section of this rule, and must be maintained in good condition—surroundings must be clean.

Fences and Cattle Guards.—10. Fences and cattle guards must be in good repair, and must be clear of tall grass and weeds.

(B)—Any condition less than prescribed in the foregoing subdivisions, will be represented by such fraction of 1 as it bears to the required condition.

(C)—The sum of markings in all of the subdivisions upon any mile multiplied by 10 and divided by the number of subdivisions noted will represent the condition of policing upon that mile.

VII. In measuring the cross section of road-bed, only such portions as are fully up to the standard (Sec. 4, Specifications for a Standard Section) will be allowed in competition for premiums.

VIII. (A)—Conditions must be represented in whole numbers and in tenths.

(B)—Conditions will only be noted where the subject is one which the Section Foreman is required to attend to, and the sum of the conditions recorded under each subject on any section divided by the number of such conditions, will be the correct average of that subject on the section.

Contributions.

Weight on Drivers.

TULARE CITY, Cal., July 27, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In looking over the details of the new Chicago, Burlington & Quincy engine, illustrated in the *Railroad Gazette* of June 11, 1886, I notice that it is stated that there is 500 lbs. more weight on the back than on the main drivers. How do you explain this difference? W. DE SANNO.

[If the equalizers are in proper working order, and neither boxes, springs nor spring links bind anywhere, the weight on the main drivers should exceed those on the hind drivers by the weight of the eccentric sheaves and straps, and part of the weight of the main and eccentric rods. As a matter of fact, however, the running gear in a new engine always works with considerable friction, and therefore, even if the weighing machine is absolutely accurate, the weight will be somewhat unequally distributed. In an old engine, where the parts are covered with dirt and old gummy oil, the same inaccuracy will be found, the equalizers not working freely, and one or more of the springs not bearing fairly on the centre of the box, and therefore twisting it in the rubbing pieces and causing undue friction. Part of the thrust of the spring is thereby transmitted to the frame, and thence through the other springs to a box that is working freely.

In addition, however, to these causes of inaccuracy in the engine itself, the weighing machine is apt to be out of order. A little rust, dirt or wear on the knife edges will affect a weighing machine seriously. One proof of the inaccuracy of the general method of weighing locomotives is to be found in the fact that if a locomotive be run on a weigh-bridge wheel by wheel, the weights given for each pair of wheels will not equal those of the locomotive as a whole. Thus if the weigh-bridge shows that the locomotive when weighed as a whole weighs 80,000 lbs., the weights on the various wheels when added together will give only 76,000 lbs. This is often caused by the weigh-

bridge being slightly lower than the rails on the adjoining track. The wheel weighed does not give its normal weight, while the wheels which remain on the track are more heavily loaded than they would be on a truly level piece of track.

The best way to weigh a locomotive is that practiced in Europe. A special machine is used, made with eight or ten separate tables, one for each wheel. These tables are all carefully leveled and squared, and their weighing mechanisms are independent, and are read off on separate scale-yards. The weight on each wheel can then be accurately ascertained. The indications of the machine as a whole can be very easily checked by comparing the total weight of each side of a locomotive. If the air-pump can account for the difference shown, none of the weighing machines are much out. Another method is to turn the engine or tender, so that the wheel weighed by machine No. 1 may now be weighed by No. 8.

A leaf from the writer's personal experience may serve to show the importance of this subject, and account for many mysterious cases of run-offs, hot boxes and broken axles. On taking charge of the motive power department of a road having innumerable 300 ft. curves and ruling grades of 132 ft. per mile, the weighing machine with separate tables for each wheel was put in good order and placed in special charge of one man, whose duty it was to weigh every engine after lifting or heavy repairs and record the results in a book. In about one month the book showed the following record as regards the truck of an American type engine which had just come out of the shops:

	Right.	Left.	Total.
Front wheels	2,100 lbs.	8,500 lbs.	11,600 lbs.
Hind wheels	7,200 "	3,200 "	10,400 "
Total	10,300 lbs.	11,700 lbs.	22,000 lbs.

The proper load on each wheel was 5,500 lbs., yet it will be observed that the load on the left front wheel exceeded this by 3,000 lbs. This journal was evidently liable to run hot, and the right front wheel was equally liable to mount the track, but with an ordinary weighing machine that engine would have gone out on the road without a hint as to its dangerous condition. It is, of course, probable that a few days' working would have brought the parts into fair working order, and thus greatly improved the distribution of weight, but in these matters, it is well to err on the right side.—EDITOR RAILROAD GAZETTE.]

The Mechanical Conundrum.

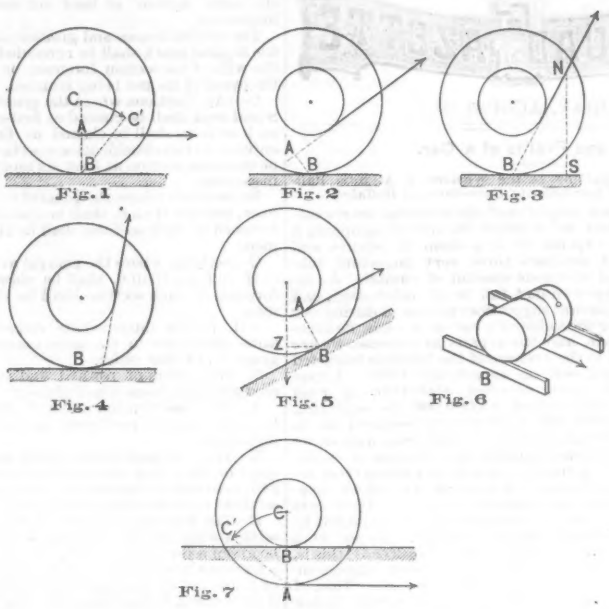
PHILADELPHIA, Aug. 10, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The correctness of the answer given by Mr. Greenswick in your issue of Aug. 6 to the "Mechanical Conundrum" in that of July 30 can be demonstrated without using a pair of railroad wheels and a piece of railroad track. Take a common wooden spool, and tie two flexible strings around the shank, one near each end, in order to diminish the tendency of the spool to "slew around" and get crossways of its intended path. Wind up the strings a turn or two on the shank, lay the spool on a table, with the strings coming out on the *under* side as shown in your cut, and pull gently. The spool will roll *toward* your hand, winding up the strings upon its shank. That it *should* do so, is easily shown by regarding the spool as a lever, with its fulcrum at B, fig. 1, its "weight" (which, in this case, neglecting the very small rolling friction, is simply the mass of "inertia" of the spool) at the centre of gravity C, and the power at A, with leverage AB. It is easily seen that the point C must tend to move toward C'. It is difficult to conceive of friction at B so slight as to allow of the *sliding* of the spool without turning, under these circumstances. Unless the hand is kept in motion away from the spool, the string will become slack, because the spool, in one revolution, travels farther toward the hand than the length of the string wound up on the axle in the same time.

If the string is *inclined*, as in fig. 2, the leverage AB (and hence the *moment*) about B of the pull is diminished, and the spool rolls somewhat more slowly. If (fig. 3) the inclination is increased until the direction of the pull passes through B, the spool will not roll, because the pull BN has now no leverage about B, but the horizontal component BS of the pull BN will simply *slide* the spool in the direction BS; provided, of course, that the friction at B is not sufficient to prevent this. If the pull becomes still more nearly vertical (fig. 4), its leverage falls to the right of B (as the figures stand), and its moment becomes "left-handed," so that the spool rolls *away* from the hand. All this may be shown in five seconds, with the simple arrangement of spool and strings suggested above.

If the *path* of the spool be inclined (fig. 5), and the pull kept parallel with it, the leverage AB (and hence the moment) about B of the pull remains constant. But there is a *contrary* moment caused by the weight of the spool acting about B with a leverage ZB, which increases with the inclination. While the inclination is slight, the spool rolls *toward* the hand; when the inclination becomes so great that the two moments are equal, the pull *slides* the spool toward it; when it becomes still greater, the spool moves *away* from the pull, partly rolling and partly sliding, because the string, being wound around the smaller diameter, does not unwind fast enough to allow the spool to roll completely on its greater diameter.



A Mechanical Conundrum.

If the spool is cylindrical (fig. 6), it *slides* toward the pull (if the track is level or slightly inclined), because the pull then has no leverage about B.

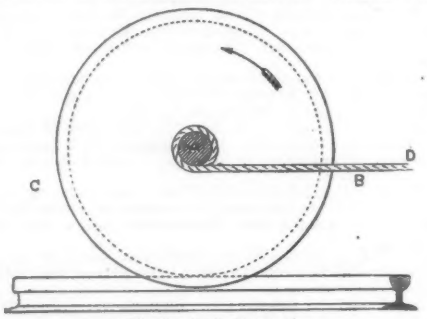
If the string be wound about the *greater* diameter (fig. 7), the moment of the pull becomes such as to make the spool roll *away* from the pull, as will be evident from the figure, or as may be shown by leaving the strings wound around the shank of the spool and running a cylindrical lead pencil through the bore in the spool, the pencil rolling upon two sticks laid parallel to each other to serve as the rails and high enough to lift the flange of the spool clear of the table.

JOHN C. TRAUTWINE, JR.

WHITE PLAINS, N. Y., Aug. 6, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I send herewith an answer to the, "Mechanical Conundrum" published in your issue of July 30. The pair of wheels will roll toward the person pulling the rope, for the following reason: If we take a pair of 33 in. wheels on a M. C. B. standard axle 4¼ in. diameter in the centre and wind a rope on it as shown in sketch and then roll the wheels one revolution, in direction of arrow, the centre A of axle will travel to the left toward C, a distance equal to the circumference of wheel tread or 103.67 in. While this revolution is being made, a length of rope will unwind equal to the circumference of the axle or 13.35 in. If the axle had motion about its axis only, the rope at B would travel toward D 13.25 in., but as it has also a motion of 103.67 in. toward C, the motion of B will be equal to the difference in the direction of the greater or 103.67—13.35=90.32 toward C. Now if the foregoing operation is reversed and B is drawn in the direction of D, the wheels will revolve in a direction opposite to that shown by the arrow.



A Mechanical Conundrum.

C. L. ROGERS.

JULY 31, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The answer to the first part of your problem about the pair of car-wheels with cord wound on the axle, will be apparent to every one on consideration of the moment of rotation about the centre of the axle, observing that the forces acting are the pull on the rope, and the reaction caused by the friction of the wheels on the rail which is equal and opposite to the pull on the rope.

A very pretty little trial of the fact may be made with any partly used spool of thread on a level surface.

As to the second part of the inquiry, it will be seen that the wheels are acted on by the two forces above-mentioned and by the gravity reaction acting upward with a lever arm pr, where p is the rate of grade per 100, and r the radius of the wheel tread. If d is the half diameter of the axle, P the pull on the rope, and W the weight of wheels and axle, to have equilibrium:

$$P(r-d) = W \times pr$$

It is evident that P can never be greater than fw, where f is the coefficient of friction, since that force is sufficient to slip the wheels along the track.

If, therefore, we substitute this value for P in the equation, we can determine the largest diameter of axle with which it is practicable to roll the wheels up hill by pulling on the rope:

$$f w (r-d) = w p r$$
$$f(r-d) = p r \quad (1)$$
$$d = \frac{(f-p)\,r}{f}$$

If, as stated in your problem, $p = 0.1$, and we assume $f = 0.2$, $d = \frac{r}{2}$

On the other hand, it is evident that there is a limit to the steepness of the grade up which the wheels may be rolled by pulling on the cord.

This maximum may be ascertained by simply assuming a ratio of axle to wheel in equation (1) and finding a value for p.

Thus, if $d = 0.05\,r$ $f = 0.2$

$$p = 0.2\,(1 - .05) = 1.19.$$

CAR WHEEL.

[We have also received communications from several other correspondents, but the three letters above cover the ground very completely.—EDITOR RAILROAD GAZETTE.]

Piece Work.

VI.—ITS APPLICATION TO REPAIRS.

In the preceding paper the methods of introducing piece work and its application to new parts was, we think, so clearly set forth as to leave its entire practicability unquestioned. It now remains to be shown that *repair* work can be accomplished with equal success under the same system. The wear of any part of a locomotive or car is removed by operations similar to those performed in original construction. The only difference is in the labor required to perform the operation in finishing the new part and that expended in repairing the old one. Differences in the amount of metal to be removed in finishing new castings or new forgings, of like pattern, exist, as every practical man well knows. An investigation of the subject will disclose the fact that the variations due to the wear of the old parts are not so great as are found to exist in the new. We may, therefore, reasonably conclude, that if the practice of establishing average prices answers in one case, it must be equally applicable in the other. The question, therefore, as touching both new and old work, resolves itself into a simple determination of the value of the operations incident to each upon like parts.

The success of the system depends entirely upon such knowledge and upon a carefully prepared schedule of prices. The method of forming such schedule has already been described in the case of new work, and it is practically the same for repairs.

In the issue of the *Railroad Gazette* of Sept. 11, 1885, a correspondent expresses the opinion that the introduction of piece-work would be attended with much dissatisfaction and trouble with the employés, unless the schedule of prices was previously arranged and completed, and the system at once generally introduced. As the views of the writer referred to are shared by many others, it may be well to state that from personal experience in this work the opposite course has been found, not only free from the objections advanced, but also best calculated to facilitate and promote its introduction. The parts of a locomotive are numerous and the mechanical operations involved still more so. Therefore, the process of preparing a complete schedule of prices would be very tedious and slow, to await the completion of which would greatly delay the work of introducing the system, and without any compensating advantage in the end. If the cost of a certain operation is ascertained, there is nothing to prevent its repetition at any time, at the fixed price, even though it be the only price established. If after trial of a price the workman is satisfied of its justice, his prejudice, and that of others who are watching the result, will very soon disappear and give place to a desire, on the part of intelligent and industrious workmen, to be permitted to share any advantages it may

M. P. NO.

SERVICE CARD.

Machine Shop..... *Date, March* 20 *to March* 23, 1886.

DESCRIPTION OF PARTS.	Operation.	Charge.	Hours day work.	Hours piece work.	Price per unit.	Earnings	REMARKS.
4 driving boxes	Fitted to journals	145			30	$1.20	
1 light shaft and stands	Replaced	"			36	36	New bolts.
1 fire-door and shade	"	"			30	30	
2 guide yokes	Polished	"			09	18	
Engine	Fired	151			34	34	Fired for testing.
Engine and tender	Coupled	"			23	23	
4 truck wheel covers	Removed	176			06	24	
4 check chains	"	"			06	24	
4 eccentric straps and rods	"	"			09	36	
Guides and cross-heads	"	176			40	80	
2 hand rails	Removed	176			22½	45	
2 tallow pipes	"	"			3	06	
4 ped. caps, shoes and wedges	"	"			15	60	
1 cross brace	"	"			22	22	Also expansive plate.
Sand box	"	"			31	31	
Cocks in boiler head	"	"			57	57	
Driving wheels	"	"			2.25	2.25	Includes jacking up eng.
2 front frames	"	"			46	92	
4 driving springs	"	"			09	36	
1 blow-off pipe	"	"			09	09	
Reverse rod and reverse lever	"	"			22	22	Also quadrant & spring.
Smoke-box extension	"	"			1.00	1.00	
Foot plate	"	"			56	56	
4 frame pads	"	"			09	36	
2 rocker boxes, arms and guide yokes	"	"			22	44	
						$12.66	

Names of workmen.	Hours piece work.	Rate per hour.	Earnings.	
H. Somers	26	25c.	$8.31	
E. O'Rourke	17	20c.	4.35	Correct:
			$12.66	B. FITZPATRICK, Foreman.

M. P. NO.

SERVICE CARD.

Laborers' shop..... *Date, March* 18, 1886.

DESCRIPTION OF PARTS.	Operation.	Charge.	Hours day work.	Hours piece work.	Price per unit.	Earnings	REMARKS.
103 draw-bar springs from freight house to car shop	Delivered	S. O. 1,015	per	100	15	$0.15	
9 bales waste to store-house	"	Lab. M. P			10	90	
55 scrap wheels freight cars	Loaded	Repairs freight cars			2½	1.38	
40 kegs white lead to paint shop	Delivered	S. O. 935			1½	60	
200 empty bbls. in car 3,502	Loaded	Cars, oil, tallow and waste			½	1.00	
1,312 fire-brick to smith shop	Delivered	C. H. M. S. Repr's of	per	100	10	1.30	
58 boxes hardware to store-house	"	S. O. 1,015			1½	87	
						$6.20	

Names of workmen.	Hours piece work.	Rate per hour.	Earnings.	
M. Carey	10	11c.	$1.24	
J. Skelly	10	11c.	1.24	
J. Conrad	10	11c.	1.24	
M. Kootz	10	11c.	1.24	
M. Merkler	10	11c.	1.24	Correct:
			$6.20	M. CRAMER, Foreman.

seem to afford over the system of day work. The writer has found this method, and also the selection for preliminary trials of the best workmen in the shop, the best means of facilitating the introduction of piece work, and avoiding the trouble which it is feared by some would be likely to result.

The opposition to the system will not spring from the better class of workmen, but from grumblers and shirks. The sooner the question is settled with this class the better for the company in more ways than one.

It seems hardly necessary to add more, what has been said should be sufficient to quiet all objections to the system. In order, however, more fully to present its workings, we will submit examples from actual practice. In the following service cards the application of piece work to repairs of locomotives on cars is illustrated. The case of locomotive No. 176 is presented. The erectors engaged in replacing the parts are given four locomotives to repair. They will thus be kept constantly engaged on one or the other of these, and lose no time while waiting for parts which are undergoing necessary repairs in other departments.

Cards for other shops and other operations are precisely similar in form and need not be given here, but in order to show that the system is sufficiently flexible to render it easily adapted to any purpose, the accompanying service cards are presented to illustrate piece work as applied to the floating gang of laborers connected with store-house and engaged in receiving and shipping material:

Further particulars showing the applicability of piece work to painting and other work will be given in a future issue.

F. D. CASANAVE.

The Burlington Tests of Train Resistance.

In order to determine just how much or how little part the natural resistances of the trains played in stopping them, in distinction from the brakes proper, and to avoid all possibility of any considerable error in the train resistance assumed or of future dispute, a preliminary run, in which the "stops" were made by the natural action of gravity and train resistance only, was made with each of the four trains which took any considerable part in the Burlington brake tests, the Rote train only not having been tested in this way.

These runs developed considerable differences of resistance, although not enough (nor was it expected that they would) seriously to affect the comparative performance of the brakes. But their especial interest is that they afford what is probably by much the most definite existing evidence as to what is the actual train resistance in pounds per ton of entire American freight trains, including the engine and head resistances. The computations of the tests are tabulated in Tables I. to III. below. The results of these computations are shown graphically in the accompanying diagram, and the train resistances assumed for computing the efficiency of the brakes are given in Table IV.

The tests were made in the following way: Each test train was caused to approach stop-post 1 (see *Railroad Gazette* of July 30, 1886, for engraving of test track) at a speed of 20 miles per hour, as nearly as possible. Steam was then shut off and the train allowed to run without any brakes as far as the energy or momentum due to that velocity would carry it. The grade was fortunately such that this was a considerable distance, nearly two miles in the quickest stop, and in the longest "stop" the train ran nearly four miles at a nearly uniform velocity, without stopping at all, until brakes had to be used on approaching stop 3.

At stop 3, after the train had run as far as it would from stop 1, the speed of the train was made five miles per hour as nearly as might be, and steam was again shut off, the train being allowed to acquire what velocity it would in descending the sharp grade (55 ft. per mile) from stop 3 to stop 4, the final velocity varying from 32 to 36 miles per hour. At stop 4 the test was concluded, and the train was stopped by power or hand brakes, as most convenient.

The elevations of the track were known by recent levels, made especially for the brake tests, in the vicinity of the stop-posts. For the intermediate distances it was necessary to rely on a profile made a year or two before, but the elevation on which had been slightly modified by recent ballasting, as was very curiously shown at one point in the computations, as specified below, by a result which strikingly illustrates the accuracy of the method.

The velocity of the train was given continuously by the record of the dynamometer car, which in each test was placed next behind the engine. The record paper of this car was moved by gearing at a uniform rate of 2 ft. per mile, and on it was recorded electrically time marks at intervals of 5 seconds. If the train were running one mile per hour, therefore, the paper would move 2 ft. per hour, or $\frac{1}{30}$ in. in one 5 seconds, and the speed at any point, whatever it may be, is given by reading the distance apart of these 5 second marks by a scale of 30 parts to an inch.

This readily admits of reading the speed to the nearest tenth of a mile. Unfortunately the feed of the paper was never absolutely uniform, but by care in taking and comparing the readings the largest probable error in determining the speed at any point in the run is about 0.2 miles per hour.

In the *Railroad Gazette* of May 15, 1885, under the head of "The Computation of the Efficiency of Brakes," we gave at some length the simplest method for computing the efficiency of brakes in making stops. As the method described was general for any retarding force whatsoever, it is, of course, equally applicable to cases where the only "brake is the retarding friction of the train itself, and we need not repeat the details of the method further than to say that a body moving through space in any direction, with any velocity whatsoever, has in it a certain amount of stored-up energy which may be expressed in the form of the number of *vertical feet* through which it would suffice to lift the body vertically against the action of gravity; in other words, it has what we may call a certain "velocity head," which is always the same at the same velocity, whatever the weight of the body, and may be precisely computed and tabulated. Such a tabulation, repeated from our former article, but condensed by omitting the differences, is given below. As no similar table, nor any convenient substitute therefor, is to be found in print elsewhere, it may prove useful to those who are disposed to make similar tests on other trains, and we repeat it likewise, as making the succeeding tables more read-

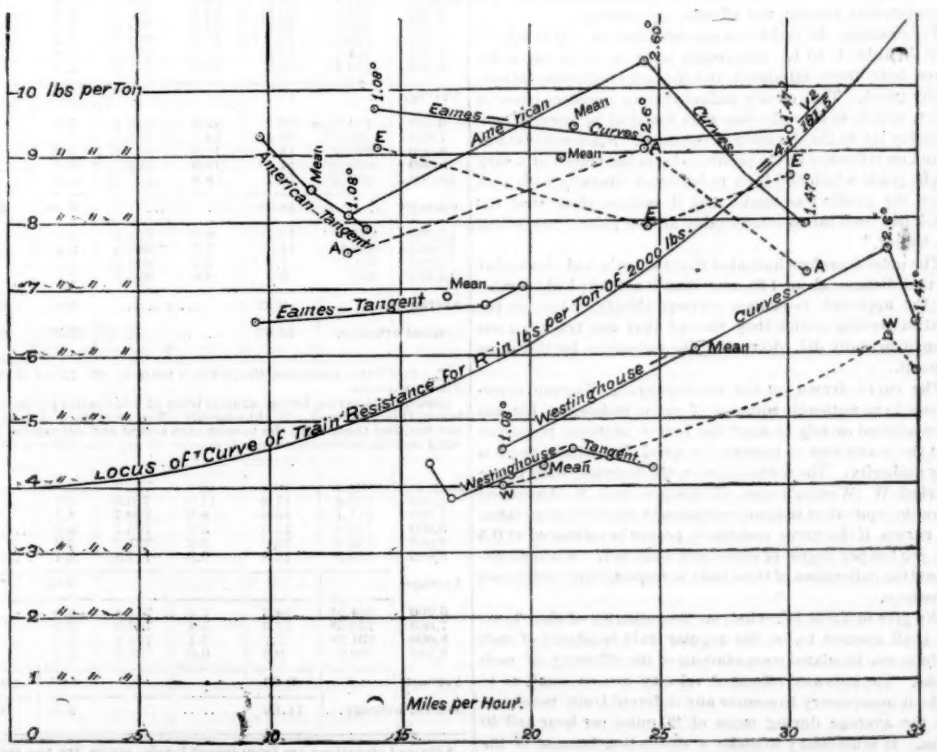


DIAGRAM SHOWING RESULTS OF THE BURLINGTON TESTS OF TRAIN RESISTANCE.

ly comprehensible, and as the only explanation—in connection with the preceding—which we shall attempt to give of the tabulated computations of the comparative efficiency of the brakes tested, which will hereafter appear in these columns:

TABLE OF THE TOTAL ENERGY OF POTENTIAL LIFT IN VERTICAL FEET IN TRAINS MOVING AT VARIOUS VELOCITIES.

Including the Effect of the Rotative Energy of the Wheels for Passenger or Loaded Freight Trains assumed at 6.14 per cent. of the total energy. For trains of empty flat or coal cars add about 4 per cent. to the quantities below, and proportionately for mixed trains

MILS. PER H.	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.
0	0.00	0.04	0.14	0.32	0.57	0.89	1.28	1.74	2.27	2.88
10	3.55	4.30	5.11	6.00	6.96	7.99	9.09	10.26	11.50	12.82
20	14.20	15.67	17.19	18.79	20.46	22.20	24.00	25.88	27.83	29.86
30	31.95	34.12	36.35	38.66	41.04	43.49	46.01	48.60	51.26	54.00
40	56.80	59.68	62.62	65.64	68.73	71.89	75.12	78.42	81.79	85.24
50	88.75	92.34	95.99	99.72	103.52	107.39	111.33	115.34	119.42	123.58
60	127.80	132.10	136.46	140.90	145.41	149.99	154.64	159.36	164.15	169.02
70	173.95	178.96	184.03	189.18	194.40	199.69	205.05	210.48	215.98	221.56

Formula: Vel. head $= \frac{v^2 \text{ in ft. per sec.}}{64.32} =$

$\frac{1{,}467^2\ V^2 \text{ (in miles per hour)}}{64.32} = 0.033445\ V^2$

To which add 6.14 per cent. for rotative energy of the wheels $= 0.002055\ V^2$

Giving as the final formula, by which the table is computed, *Vel. head* $= 0.035500\ V^2$

The energy corresponding to the initial speed being known from this table and the amount of energy destroyed or contributed by gravity from the profile, the difference between the energy in the train at the beginning and end of any given section of track affords a ready means of determining the frictional resistance, as will be seen in Tables I. and II. herewith, where are given the computations based upon the above table and the dynamometer records of speed. The velocity at the start and at each even 1,000 ft. thereafter until the train came to a stop was read for each train. The elevation of the track under *the centre of gravity* of the train (not the engine) was likewise determined for each of these points 1,000 ft. apart.

Then if, as in the first line of Table I., the engine passed the initial point with a velocity of 21.5 miles per hour, the corresponding "velocity head," or height to which the energy corresponding to that velocity will lift it on a grade or otherwise, is, by the table above, 16.4 ft. A thousand feet further on the velocity was only 21.3 miles per hour, corresponding to 16.1 ft. of "vertical head." In this distance the track itself fell 724.2 — 723.0 = 1.2 ft., and in addition there was lost by the decrease of velocity 16.4 — 16.1 = 0.3 ft., a total of 1.5 ft. in 1,000, so that the grade equivalent to the train resistance is 0.15 per 100, or 3.00 per 2,000 = 3.0 lbs. per ton.

This result is reached more quickly in the table, as follows: The train at the initial point being at elevation 724.2 ft. and having a "velocity head" of 16.4 ft., is potentially or "virtually" at elevation 724.2 + 16.4 = 740.6. At the next station, the elevation being 723.0 and the "velocity head" 16.1, we have 723.0 + 16.1 = 739.1. The difference between these gives 1.5 ft., as before. So we may proceed, determining what we may call "virtual" elevations, being those the difference between which exactly corresponds to the fall in the track necessary to balance the loss by friction in that distance. The longer the horizontal distance the less the effect of any error in levels or in the determination of velocity. When a number of sections succeed each other, however, any error in the intermediate elevations or velocities will simply increase one resistance and diminish another by a corresponding amount, not affecting the average.

For example, the resistance opposite station 6,000 will be seen in Table I. to be abnormally large in every one of the three tests there tabulated, and the next following abnormally small. This clearly indicated some common cause of error, which, as the velocities were found to be correct, presumably lay in the elevation of the track. Station 6,000 was found on reference to the profile to lie in the hollow of a very slight grade which had been re-ballasted liberally with rock since the profile was made, and it became clear that the track had been raised considerably at that point "to take out the hollow."

The notes therefore indicated that the train had descended on that distance about 1 ft. more than it actually had, increasing the apparent resistance correspondingly, while on the next succeeding section they showed that the track fell less than it actually did, decreasing the resistance by the same amount.

The curve drawn on the accompanying diagram corresponds to no authentic equation of curve resistance, but has been selected merely to show the lowest uniform resistance and the lowest rate of increase for speed for which there is any authority. The dotted lines on the diagram, with points marked W (Westinghouse), E (Eames) and A (American) show the equivalent tangent resistance to the resistances taken on curves if the curve resistance proper be estimated at 0.5 lbs. per ton per degree of curve and deducted. We have discussed the indications of these tests as respects curve resistance elsewhere.

We give in Table IV. what, on the authority of these tests, we shall assume to be the regular train resistance of each train in our tabulated computations of the efficiency of each brake. The indicated effects of velocity are so small as to make it unnecessary to assume any different train resistance for the average during stops of 20 miles per hour and 40 miles. It is necessary to make a distinction because of the curvature only

The weights of the trains tested were as follows, in tons of 2,000 lbs.:

	Westinghouse.	Eames.	Widdifield & Button.	Rote.	American
25 cars	301.07	261.41	261.92	301.23	344.79
12 loads, at 20 tons each	240.	240.	240.	240.	240.
Equalizing load, when used	0.25	39.83	39.37	.....	.....
Dynamometer car with 15 persons.	16.50	16.50	16.50	16.50	16.50
Way car with 10 persons	13.55	13.55	13.55	13.55	13.55
Total train	571.37	571.29	571.34	571.28	614.84
Engine on drivers	26.54	26.40	26.40	26.54	25.02
" on truck	14.07	14.52	14.52	14.07	14.25
Tender empty	12.35	12.35	12.35	12.35	12.35
" "	15.15	15.15	15.15	15.15	15.15
Total engine and train	639.48	639.71	639.76	639.39	681.61
Of which there was braked	339.66	300.16	300.67	340.12	382.16
Per cent. braked	53.16	46.90	46.90	53.17	56.04

All the trains had Master Car-Builders' standard axles (3¾ × 7 in.) except the Widdifield & Button, which had 3¼ × 7.

We shall be compelled to postpone to a following issue a summary of the indications of these tests as respects the laws of train resistance, which in many ways are notable.

TABLE I.

GRAVITY TESTS OF TRAIN RESISTANCE ON LEVEL TANGENT.

SPEEDS DECREASING FROM 20 MILES PER HOUR—25 MIXED CAR TRAINS, 12 LOADED, 13 EMPTY, WITH DYNAMOMETER CAR AND WAY CAR—AMERICAN 17 × 24 IN. ENGINES.

A—*Test* 151—*Westinghouse train—Chicago, Burlington & Quincy Cars.*

(Train did not come to a stop at all on track shown by profile in *Railroad Gazette*, June 30, but at end of following test speed was checked down to 5 miles per hour by the brakes, to prepare for the next succeeding test.)

STATION.	Elev. track at c. g. of train.	Speed. Miles per hour.	Vel. head (by table).	Virtual elevation	Diffs. in do.	Lbs. per ton resistance.
Stop 1.	724.2	21.5	16.4	740.6	.....	.....
1,000	723.	21.3	16.1	739.1	1.5	.....
2,000	721.3	20.6	15.1	736 4	2.7	.....
3,000	720.	21 0	15.7	735.7	1.7	.....
4,000	715.8	21.0	15.7	731.5	4.2	.....
5,000	710.3	23.9	20.3	730.5	1.0	.....
Average.	.....	21.55	.....	.....	2.22	4.44
6,000	704.4	24.8	21.9	720.2	3.3	.....
7,000	702.4	25.3	22.7	725.1	1.1	.....
8,000	701.6	25.3	22.7	724.3	0.8	.....
9,000	699.3	24.3	21.0	720 3	4.0	.....
10,000	698.1	24.2	20.8	718.9	1.4	.....
Average.	.....	24.78	.....	.....	2.12	4.24
11,000	694.4	24.6	21.5	715.9	3.0	.....
12,000	692.0	24.5	21.3	713.3	2.6	.....
13,000	694 2	21.8	16.9	711.1	2.2	.....
14,000	695.0	19.8	13.9	708.9	2.2	.....
15,000	697.0	17.2	10.5	707.5	1.4	.....
Average.	.....	.....	.....	.....	2.28	4.56
16,000	698.5	14.3	7.3	705.8	1.7	.....
17,000	695.9	14.6	6.6	702.5	3.3	.....
18,000	693.1	16.2	9.3	702.4	0 1	.....
19,000	690.3	16 7	9.9	700.2	2 2	.....
20,000	684.4	18.5	12.2	696.6	3.6	.....
Average.	.....	.....	.....	.....	2.18	4.36
21,000	682 2	19.0	12.9	695.1	1 5	.....
22,000	684.3	16.4	9.6	693 9	1.2	.....
23,000	682.5	15.4	8.4	690.9	3.0	.....
Average.	.....	16.93	.....	.....	1 90	3.80
General average...		20 51	.....	.....	2 16	4.32

B—*Test* 351—*Eames Automatic Vacuum train of Indianapolis, Decatur & Springfield cars.* Train made up as above.

(The Widdifield & Button train of Lehigh Valley cars gave results practically identical with the following, and was not separately computed.)

Stop 1...	723.8	22 5	18.0	741.1	.....	.....
1,000	732.6	20.6	15.1	737.7	3.4	.....
2,000	721.0	19.3	13.2	734.2	3.5	.....
3,000	719.6	18.1	11.6	731.2	3 0	.....
4 000	714.7	18 0	11.5	726.2	5.0	.....
5,000	709.7	19.7	13.8	723.5	2.7	.....
Average.	.....	19.7	.....	.....	3.52	7.04
6.000	704.2*	20.7	15.2	719.4	4.1	.....
7,000	702.3*	20.0	14.2	716.5	2.9	.....
8.000	701.3*	18.0	11.5	712.8	3.7	.....
9,000	699.2*	17.0	10.3	709.5	3.3	.....
10,000	697.8*	15.7	8.8	706.6	2.9	.....
Average.	.....	18.28	.....	.....	3.38	6.76
11,000	694 0*	13.7	8.8	702.8	3.8	.....
12,000	694.1*	14 3	7.3	699.4	3.4	.....
13,000	694.2*	7.7	2.1	696.3	3.1	.....
13,475	695.	0.0	0.0	695.0	2.7	.....
Average.	.....	9.42	.....	.....	3.25	6.50
General average...		16.82	.....	.....	3.42	6.84

C—*Test* 721—*American Brake Co.'s train of St. Louis & San Francisco cars.*

(Gentle quartering breeze against train of 4 to 6 miles per hour in test of this train only. Might possibly affect resistance ¼ to ½ lb. per ton, but these were the newest cars tested and allowance for wind resistance does not seem necessary to explain differences.)

Stop 1...	724.1	19.4	13.4	737.5	.....	.....
1,000	722.6	17.8	11.2	733.8	3.7	.....
2,000	721.1	15.6	8.6	729.7	4.1	.....
3,000	719.6	12.5	5.5	725.1	4.6	.....
4,000	715.0	13.2	6 2	721.2	3.9	.....
5,000	710.0*	13.8	6.8	717.8	3.4	.....
Average.	.....	.....	.....	.....	3 94	7.88
6,000	704.5*	14.3	7.3	711.8	6.0	.....
7,000	702.5*	12.3	5.4	707.9	3.9	.....
8,000	701.3*	7.7	2.1	703.4	4 5	.....
8,745	709.3	0.0	0.0	700.3	4.2	.....
Average.	.....	9 30	.....	.....	4.65	9.30
General average...		11.68	.....	.....	4.25	8.50

* Starred elevations are from recent levels made for the tests; the other elevations from a profile one year old, both agreeing well.

TABLE II.

GRAVITY TESTS OF TRAIN RESISTANCE ON DOWN GRADE CURVES.

SPEEDS INCREASING FROM 5 MILES PER HOUR BY ACTION OF GRAVITY ON A DOWN GRADE AVERAGING ABOUT 55 FT. PER MILE. SAME TRAINS AS IN TABLE I. NO WIND.

A—*Test* 152—*Westinghouse train, as above.*

(Train stopped by brakes in all the following tests on engine reaching stop-post 4. See map, *Railroad Gazette*, July 30, 1886.)

STATION.	Elev. track at c. g of train.	Speed miles per hour.	Vel. head (by table).	Virtual elevation	Diffs. in do.	Lbs. per ton resistance.
Stop 3..	672.1	6.2	1.4	673.5	....	.....
500	668.2	10.0	3.6	671.8	1.7	.....
1,000	663 2	13 2	7.2	665.4	2.4	.....
1.500	657.7	16 1	9.2	666 9	2.5	.....
2.000	653.1	18 9	12.7	665.8	1.1	.....
2,500	647.5	19.8	13.9	661.4	4.4	.....
Average.	.....	.....	.....	.....	2.42	9.68
3.000	642 2	22.6	18.2	660.4	1.0	.....
3,500	637.7	24.2	20.8	658.5	1.9	.....
4.000	632.3	25.4	22.9	655.9	2.6	.....
4.500	627.1*	27.0	25.9	653.4	2.5	.....
5,000	621.5	28 3	28.4	649.9	3.5	.....
Average.	.....	.....	.....	.....	2.30	9.20
5,500	616.9	29 6	31.1	648.0	1.9	.....
6,000	612.7	30 5	33.0	645.7	2.3	.....
(4) 6,560	606.7	32.0	36.4	642.6	3.1	.....
Average.	.....	.....	.....	.....	2.34	9.36
General average....		21.70	.....	.....	2.355	9.42

B—*Test* 352.—*Eames Automatic Vacuum train, as above.*

(Widdifield & Button train substantially identical)

Stop 3...	672.4	6.4	1 5	673.9	.....	.....
500	668.7	10.9	4 2	672.9	1.0	.....
1,000	663.9	14.2	7.2	671 1	1.8	.....
1,500	658 4	18.0	11.5	669.9	1.2	.....
2,000	653.7	21.0	15.7	669.4	0.5	.....
2,500	648.1	23.8	20.1	668.2	1.7	.....
Average.	.....	18.86	.....	.....	1.14	4.56
3,000	642.0	26.0	24.0	661.0	1.2	.....
3,500	638.4	28.0	27.8	666.2	0.8	.....
4.000	632.9	29.3	30.5	663.4	2.8	.....
4,500	627.7*	31.0	34.1	661.8	1.6	.....
5,000	622.2	32.2	36.8	659.0	2.8	.....
Average.	.....	33.90	.....	.....	1.89	7.56
5,500	617.4	33 4	39.6	657.0	2.0	.....
6,000	613.4	35.0	43.5	656.9	0.1	.....
(4) 6,560	606 9	36.4	47.1	654.0	2.9	.....
Average.	.....	34.9	.....	.....	1.60	6.41
General average...		26.33	.....	.....	1.52	6.07

C—*Test* 722.—*American Brake Co.'s train, as above.*

Stop 3	672.4	4.6	0.7	673.1	.....	.....
500	668.7	7.8	2.1	670 8	2.3	.....
1,000	663.9	11.6	4.8	668.7	2.1	.....
1,500	658 4	15.2	8 2	666 6	2.1	.....
2,000	653.7	18.5	12.2	665.9	0.7	.....
2,500	648.1	20.5	14 9	663.0	2.9	.....
Average.	.....	13 03	.....	.....	2.02	8.08
3,000	643.1	22.1	17.3	660.4	2.6	.....
3,500	638.4	23.4	18.5	656.9	3.5	.....
4.000	632.9	25 2	22.6	655.5	1.4	.....
4,500	627.7*	27.4	26.7	654.4	1.1	.....
5,000	622.2	28.0	27.8	650.0	4.4	.....
Average.	.....	24.45	.....	.....	2.50	10.40
5,500	617.4	29.8	31.5	648 9	1.1	.....
6,000	613.4	30 2	32.4	645 8	3 1	.....
6,560	606.9	32.3	36.9	643.8	2.0	.....
Average.	.....	30.75	.....	.....	1.99	7.94
General average...		21.10	.....	.....	2.23	8.94

TABLE III.

SUMMARY OF TABLE I. AND II.

Giving the mean resistances in pounds per ton (of 2,000 lbs.) shown in Tables I. and II., with the corresponding velocities in miles per hour.

(Each of the resistances on tangent is the average on a run of 5,000 ft. Each of the resistances on curves the average on a run of 2,500 ft.)

	Resistances on tangent. Vel.	Resistances on tangent. Resist.	Resistances on curves. Vel.	Resistances on curves. Resist.	Curve.	Tang. resist.*
	16.93	3.80	18.86	4.56	1.08°	4.02
Westinghouse train	16.06	4.36	33.90	7.56	2.60°	6.26
(C. B. and Q. cars)	21.58	4.56	34.90	6.41	1.47°	5.68
	24.78	4.24	.....	....	... ..	....
	21 55	4.44	.....	....	.....	....
Mean..... .. .	20.51	4.32	26.33	6.07	1.75°	6.20
Eames train (L., D. & S. cars) and	8.42	6.50	14.03	9.68	1.08°	9.14
Widdifield & Button (L. V. cars).	18.28	6.76	24.55	9 20	2.60°	7.90
	19.70	7.04	30.10	9.36	1.47°	8.63
Mean.....	16.82	6.84	21 70	9.42	1.75°	8.55
American train (St. L. & S. F. cars.)	9.62	9.30	13.03	8.08	1 08°	7.54
	13.72	7.88	24.45	10.40	2.60°	9.10
	... ..	.....	30.75	7.84	1.47°	7.21
Mean.	11.66	8.50	21.19	8.94	1.75°	8.07

* Tangent resistance determined by subtracting ½ lb. per degree of curve from the total resistance. Average degree of curve determined by determining degrees of central angle passed over by head and rear of train on given distance, averaging the two, and dividing by number of stations.

TABLE IV.

ASSUMED AVERAGE TRAIN RESISTANCE DURING STOPS.

Used in Computing Comparative Efficiency of Brakes.

	Tangent stops, 1 and 2.	Curve stops, 3 and 4.
Westinghouse train.....	0.22	0.30
Eames, Widdifield & Button and Rote trains...	0.35	0 45
American train.....	0.40	0.50

The McGrew Railroad Ditcher.

This ditcher was invented by Alonzo H. McGrew, of Yankton, D. T., and was patented May 26, 1885.

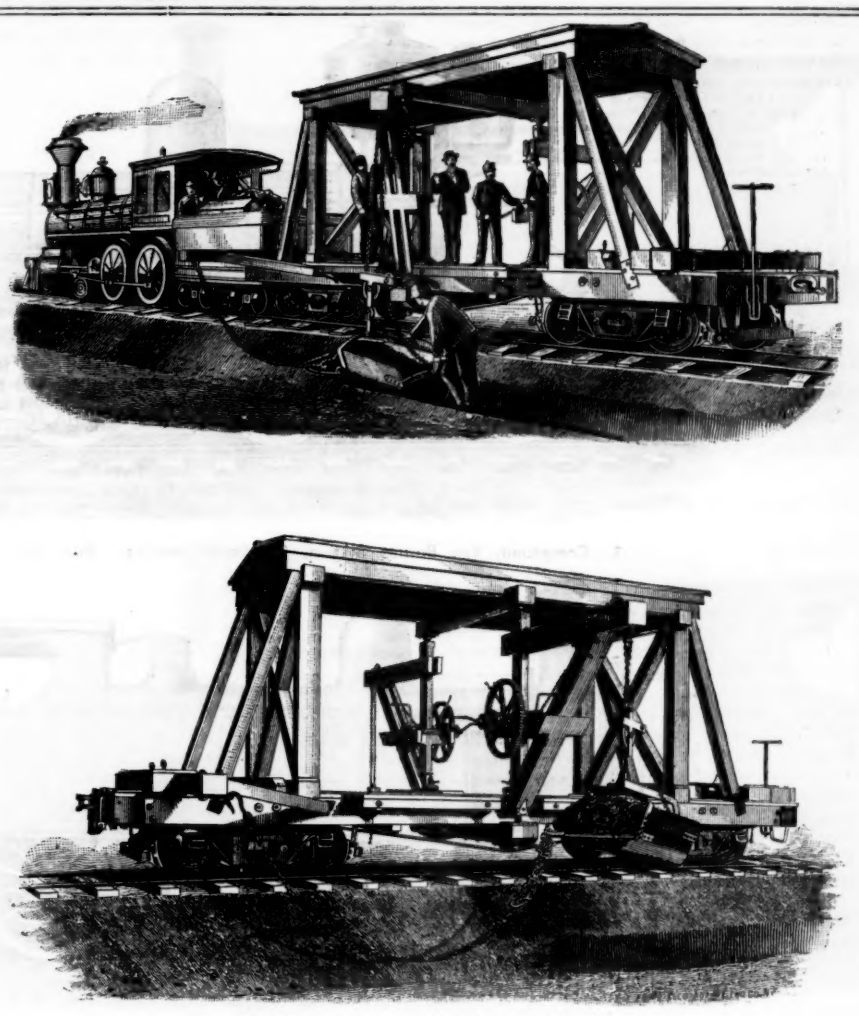
This machine is especially adapted to the work of opening and trimming ditches alongside the tracks of railways, to facilitate proper drainage of the track. It is particularly useful in opening ditches in wet and sliding cuts, and it is also well adapted to the work of widening cuts and lowering the grade of the road-bed. The invention consists in the peculiar constructions and combinations of the parts of the ditching machine, whereby it is made capable of doing a large amount of work with maximum economy of time and labor. The following description of the machine will be more readily understood by frequent reference to the accompanying illustrations, which show one scoop at work in the ditch. At the same time the other scoop is at work on the opposite side, but cannot be seen because of the intervention of the car. The ditcher works on both sides at the same time. This car is of a standard length, width and height, the same as an ordinary platform car. The scoops are handled by means of the derricks and windlasses, which are worked by men. The car is moved back and forth by means of a locomotive engine.

A cross-beam is fastened securely to and beneath the sills of the car, at its centre, and projects beyond them sufficiently out on each side of the car to form bearings or supports for the lower pivots of the posts of the derricks, the upper pivots of which have their bearings in the ends of the cross-beam, which is held directly over the lower cross-beam and is made fast to the top beams of the frame. These top beams are fixed to the posts which rise from the sills of the car. To the derrick beams thus made are fixed the arms or jibs, and braces connecting the outer end of the arm with the lower end of the posts. A suitable windlass, with ratchet and brake, is attached to the inner face of each post. A chain passes from this windlass over a sheave or roller at the outer end of the arm, thence downward around the sheave attached to the traveler and upward, where it is attached permanently to the end of the arm, all of which will be easily seen in the accompanying illustrations.

The derrick thus formed being pivoted can be swung to the right or left, as the occasion may require, thus placing the bucket out any distance desired from the track, as far outward as 9 ft. from the outside of the rail. At the same time the draft beams at each end of the car are adjusted to any distance desired, and in this manner the ditch can be cut any distance desired from the track, not to exceed 9 ft. from the outside of the rail.

The scoop is made of steel and will hold about three quarters of a cubic yard. It is dropped into the ditch, as shown in the cut, after which the car is propelled forward until the scoop is filled. The bail, as shown in the illustrations, being forward of the centre, the scoop will raise with the front slightly inclined upward, thus preventing the dirt from escaping. To the scoop bail is attached a horizontal bar which passes the full length of the scoop and attaches to it at the rear. Upon this bar is placed a traveler, at the upper end of which is a frame in which is placed a sheave or roller through which the chain from the windlass passes, as before described. At the rear of the scoop is attached a small chain which likewise passes around a small sheave, through the frame, and rests upon it by means of a cap attached to the upper end of the chain. The chain from the windlass, passing around the large sheave, passes through this cap. At the proper place in the long chain is placed a large link which will not pass through this cap. After the scoop is filled it is raised up by means of the windlass until this large link passes around the sheave and comes in contact with the cap at the upper end of the small chain. With the scoop thus raised up, the car is drawn out of the cut to an adjoining fill, the windlass is then turned once or twice around; the large link being in contact with the cap, raises the small chain, and consequently the back end of the scoop. After the back end of the scoop has been raised so that it is slightly higher than the front end the traveler at once runs to the back end of the bail bar, and the scoop drops nose downward, its weight and that of the load giving it a sufficient jar to discharge its load. Experience has demonstrated that the jar in dumping the scoop is sufficient to discharge its load, no matter what material it may contain. The car is then returned to the cut, the scoops filled and the same operation repeated.

It requires six men to operate this ditcher aside from the ordinary train crew. This ditcher has been practically tested and is now in use upon the Chicago & Northwestern and the Minneapolis & St. Louis railroads. Its owners claim that it will do the work of fifty men in dirt where the shoveling would be good, while in wet earth or clay it will do proportionately more. In very wet and muddy cuts, where men cannot operate with shovels, it is found especially useful. Any further particulars may be obtained of the makers, the McGrew Ditcher Railroad Co., 163 Washington St., Chicago.



THE McGREW RAILROAD DITCHER.

Shop Notes.

The Baldwin Locomotive Works are at present extremely busy, and working up to about their full capacity, turning out some 13 locomotives per week, or at the rate of fully 650 per annum.

A considerable number of engines now building have the Wootten fire-box, which is now to be tried on a large scale on both the Erie and the Baltimore & Ohio. On the latter line it is intended to burn small soft coal, while on the former line the Wootten fire-box is to be used, because it is considered the most suitable for anthracite coal, and the latter is considered to annoy the passengers least with dust and cinders. It will therefore be seen that the Wootten fire-box is to be tried for distinct reasons in each case.

On both lines the Wootten fire-box is to be tried on passenger engines. The Baltimore & Ohio engine is of the American type, with 18 in. by 24 in. cylinders and 69 in. wheel. The Erie engine is of exceptional size and power, being a Mogul with 20 in. by 24 in. cylinders and 60 in. wheels. The tractive power will consequently be 160 lbs. per pound of average pressure in cylinders. The engine consequently has 40 per cent. more cylinder power than an American type engine with 18 in. by 24 in. cylinders and 68 in. wheels. As the weight on drivers can also be easily arranged so as to be 40 per cent. in excess, there need be no difficulty as regards adhesion. It is, however, a little difficult to provide 40 per cent. extra boiler power. However, larger and stronger boilers are being used in all classes of engines, and no part of an engine shows a stronger tendency to increase in size.

In addition to the two engines for the Baltimore & Ohio and the two for the Erie, the Baldwin works are building a ten-wheel engine with Wootten fire-box for the Pennsylvania Coal Company. In all these engines the dome is placed in front of the cab, and not inside it as in the Philadelphia & Reading engines. The Calumet & Hecla Mining Company has also ordered a sister engine to the "Kitchigami," * but while unaltered in other respects, the barrel of the boiler will be 2 in. larger in diameter.

The drawings have been commenced of some Consolidation engines with Wootten fire-boxes for the Erie.

The tendency to increase the size of boilers is shown in some "Decapods" building for the Northern Pacific. These engines fairly promise when completed to be the largest engines in the world, as it is estimated they will have 140,000 lbs. on the drivers. The general dimensions and arrangement of parts will be very similar to the enormous Decapod for Brazil built last year by the Baldwin works.† The boiler of this engine was of enormous size, 64 in. diameter, but the Northern Pacific engine will have a boiler 4 in. larger in diameter or 68 in. diameter. The difference in cubic capacity, which may be taken as a measure of the relative heating surface of the two boilers, is fully 13 per cent. in favor of the Northern Pacific. As, however, the coal on that line is of very inferior quality, a large amount of heating surface is absolutely essential. The Consolidation engine for the same line exhibited at the Chicago Exposition of Railway Appliances had a boiler 60 in. diameter, which was, of course, considered very large, but the Decapod will have a boiler of some 28 per cent. greater cubic capacity, giving about 30 per cent. greater heating surface.

The Baldwin and the Rogers Locomotive Works are each building one engine for the Autofagasta Railway, a line of 30 in. gauge in South America. Two compound engines on Mr. Webb's system are now at work on that line. The comparison between two English compound engines and two American non-compound would, however, be more satisfactory and yield more valuable results on a line of wider gauge. A line of 30 in. gauge does not give scope enough for a satisfactory engine of any considerable power, no matter what design may be adopted. The Webb engines have six drivers 36 in. diameter, two high-pressure cylinders 10 in. diameters by 20 in. stroke, and one low-pressure 20 in. diameter by 18 in. stroke. The power of the engine is therefore equal to an ordinary locomotive, with a pair of 14½ in. by 18 in. cylinders and 36 in. wheels, which dimensions give a tractive power of 100 lbs. per pound of average pressure in cylinders. These engines carry coal and water on their own frame. The front end is carried on a four-wheel truck and the hind end on a two-wheel truck, so that the engine has twelve wheels in all. The weight in all is 35 gross tons, or 78,400 lbs. The engine now building at the Baldwin Works is considerably smaller, having four coupled wheels and a pony truck at each end, and carrying fuel and water on the same frame. This engine is remarkable for the frames being wholly outside the wheels, and is the first engine with outside frames ever built by the Baldwin Works. It is, however, singular that in all five engines with outside frames are now being built, the other four being of very peculiar design, as will be seen further on in this article.

An engine for the Connellsville Coke Company forms a strong contrast with the Northern Pacific engine. The boiler is the smallest used on a standard gauge engine, being only 24 in. diameter. Many master mechanics will recollect the little engine which conveyed them over the little Beach Haven line after the convention at Long Branch in 1884. This boiler is of the same size, but really standing ahead of the engine looks smaller, being dwarfed by the apparently wide spread cylinders and saddle.

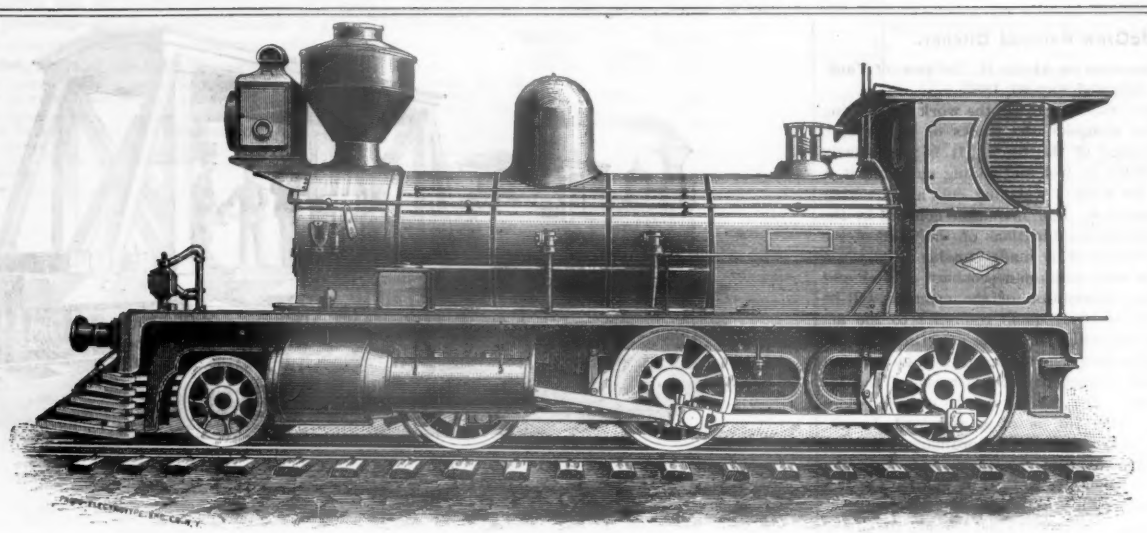
Four of Honigmann's soda engines are being built for the Minneapolis, Lyndale & Minnetonka line. The principle of the soda engine has been already fully described in these columns.*

The great advantage of these engines is that they have no fire and emit no steam. The boiler is divided into three compartments. The two end compartments communicate with one another by means of tubes passing through the centre compartment. The latter is charged with five tons of hot caustic soda, which communicates its heat to the water in the tubes and end compartments and raises steam. When the engine is started, the exhaust from the cylinders is turned into the soda, diluting it, and strangely enough, though the pressure is very low, it contains heat enough to continue evaporating the water in the end compartments, and supplying steam to the cylinders for several hours working, until the dilution becomes excessive. The engine is then returned to the round-house or central station, which is provided with a battery of ordinary boilers. Steam from these boilers is led through the tubes, traversing the soda compartment, and the water (from the exhaust) is evaporated, restoring the normal strength of the solution. The engine is then ready for work again. The caustic soda apparently undergoes no deterioration in quality from this alternate dilution and con-

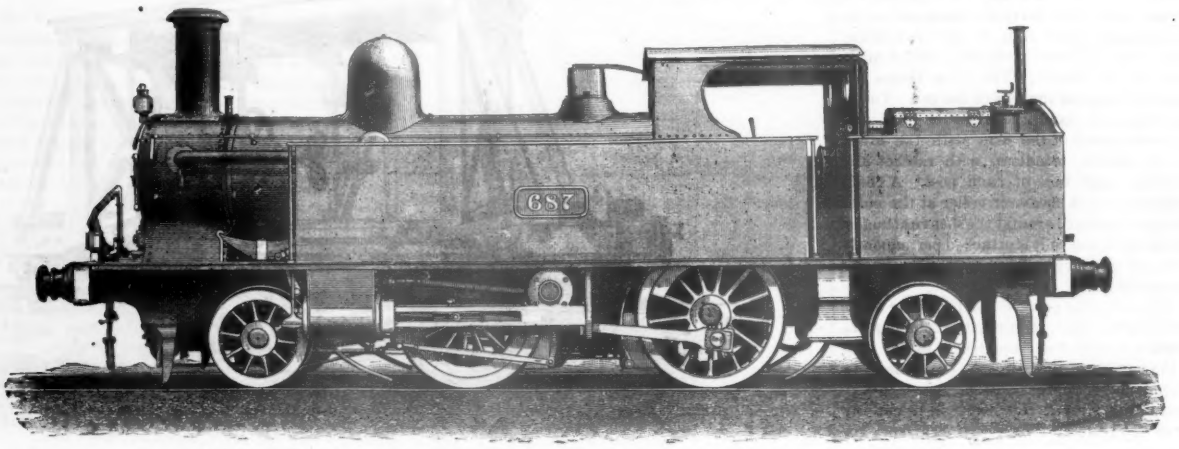
* This engine was illustrated in the *Railroad Gazette* Jan. 22, 1886. It is also shown in the new and enlarged edition of *Recent Locomotives*, Figs. 283-289.

†This engine was illustrated in the *Railroad Gazette*, May 1, 1885. Illustrations and particulars will also be found in the enlarged edition of *Recent Locomotives*.

* See the *Railroad Gazette*, July 3, 1885, for full description and illustration of very similar engines.



3. Compound, Van Borries System, for South America. Built by Dubs & Co., Glasgow, Scotland.



4. Compound Local Passenger, Webb's System. Built at Crewe Works, London & Northwestern Railway.

RECENT ENGLISH COMPOUND LOCOMOTIVES.

centration, and will do good service for an indefinite period. As, however, it attacks iron pretty vigorously, all the parts in contact with the soda are made of copper, shell, tubes, rivets, etc.

The boiler or soda tank is 64 in. diameter, and about 12 ft. long. The working pressure of steam will be from 60 to 80 lbs. per square inch. The engine has 14½ in. by 20 in. cylinders and is expected to develop the same power and do the same work as the present dummy engines used, which are of the ordinary locomotive type, with 11 in. by 14 in. cylinders. In these four engines the frames are outside, so as to bring the springs, etc., clear of the big boiler, the line being on the 36-in. gauge. The engines will be completed and set to work within the next 10 days, and will doubtless excite a great deal of interest. The next annual convention of the Master Mechanics' Association will be held at Minneapolis or St. Paul, and these engines will be one of the many novel and interesting sights the Master Mechanics will then be enabled to witness.

The Baldwin Works some time ago tried some experiments with welding frames with hydraulic pressure, but finding the results not entirely satisfactory abandoned that method, and now weld frames under the steam hammer. All the regular sized plates are now flanged by hydraulic pressure with great success, the only fault found with the machine being that it performs the work so quickly that it is standing idle most of the time. Some experiments are now being made in flanging plates of irregular shapes and sizes.

Foreign Technical Notes.

Bolckow, Vaughan & Co., of Middleborough, have secured an order for 60,000 tons of steel rails for the Swedish & Norwegian Railway, a line that was referred to in a ecent issue as being the most northerly railroad in the world. The rails now contracted for will, with the supply on hand, be sufficient to complete the 125 miles of the company's line from the great iron mountain of Gil ivara to the port of Lulea. This iron ore is inexhaustible, and is said to contain 70 per cent. of metallic iron.

The locomotive works of Borsig, in Berlin, one of the most famous in Europe, has suspended operations, because, as the executors of the Borsig estate say, "the prices for locomotives have reached a level which does not pay the cost of making them."

Recent English Locomotives, Compound and Non Compound.

The accompanying illustrations of four recent English engines, show very clearly the increasing favor with which the compound locomotive is regarded in Europe. All the engines illustrated have been built within the last few months, but only one of them is a simple or non-compound locomotive on the ordinary plan. This engine is shown in Fig. 1, and has precisely similar heating surface, wheels, etc., as the compound engine shown in Fig. 2, the only difference being that caused by the adoption of the compound system. The front wheels are moved further forward, so as to properly distribute the increased weight of the cylinders, and the valve gear of the high-pressure outside cylinders is worked from the hind drivers.

Descriptions of the Webb system of compounding have already appeared in these columns, but it may be useful to repeat that the two high pressure outside connected cylinders take steam from the boiler in the ordinary manner. They exhaust, however, into a coil of pipes inside the smokebox, and the steam being thus slightly superheated passes to the valve-chest of the single low-pressure cylinder, which is placed belween the frames, and is connected with what, in an ordinary locomotive, would be the main driving-axle. This axle is bent to form a single crank for the connecting rod end of the one central low-pressure cylinder. Joy's valve gear, actuated by the connecting-rod, is used for both high and low-pressure cylinders.

The engine is started by the high-pressure cylinders, and the low-pressure cylinder cannot receive any steam until the high-pressure drivers have made a revolution. Should the high-pressure cylinders be unable to start the engine they will slip the wheels to which they are connected and thus give the low-pressure cylinder a supply of steam. The low-pressure cylinder then lends its aid to start the engine.

Steam is never admitted direct from the boiler to the low-pressure cylinder, as it is considered that a risk is run of unduly straining the parts, and the additional complication of a reducing valve is considered unnecessary.

One great feature of Mr. Webb's system is the abolition of coupling rods. The drivers may thus be of unequal diameters without giving any prejudicial results.

The Mogul engine illustrated is compounded on the Von Borries system, which has been much used in Germany, Austria and Russia, and undoubtedly presents many advantages. The only additional working part is a starting valve, which is very simple and is self closing. But two cylinders are employed, one high-pressure and one low-pressure, acting on cranks at right angles, as in an ordinary locomotive. The high-pressure cylinder receives steam direct from the boiler and exhausts into a chamber or receiver from which the low-pressure valve chest is supplied with steam. The principal objection to this form of engine is that when made with outside cylinders, it is difficult to find room for a very large low-pressure cylinder. In starting, steam is admitted to the low-pressure valve through a reducing-valve which closes itself after a stroke or two. The engine, when once fairly started, must consequently work compound, and, therefore, even when exerting its greatest power, works with a considerable degree of expansion.*

* The advantages and disadvantage of this, and of many other peculiarities of the compound locomotive are very fully discussed in the enlarged edition of *Recent Locomotives* just published.

Numerous trials have been made in Germany with compound locomotives on the Von Borries system. The compound engines in freight service have shown an economy of from 14.3 to 21 per cent. as compared with ordinary freight engines running in the same service. With stopping passenger trains, a compound tank has been found to burn 17 per cent. less fuel than a non-compound tank engine of precisely similar proportions, size, weight and working pressure of steam. The saving with express and fast mail trains ha varied from 14.5 to 16 per cent.

The principal dimensions of the three engines built by Dubs & Co. (Figs. 1, 2 and 3) are shown in the following table:

	Compound Von Borries system.	Compound Webb's system.	Non-compound passenger.
Cylinder, high-pressure, diam. and stroke	16 in. × 24 in.	12 in. × 24 in.	.....
Cylinder, low-pressure, diam. and stroke	23 in. × 24 in.	24 in. × 24 in.	.....
Ratio of cylinders.	1 to 2.06	1 to 2	.....
Equal to pair cylinders	16¼ in. × 24 in.	17 in. × 24 in.	17 in. × 24 in.
Tractive force per lb. average pressure in cylinders.	140 8 lbs.	96 lbs.	96 lbs.
Working boiler pressure	175 lbs.	120 lbs.	120 lbs.
Drivers diameter	45 in.	72 in	72 in.
Carrying wheels, diameter	32 in	42 in.	45 in.
Wheel base, E. & T.	36 ft. 7⅝ in	36 ft. 8 in.	34 ft. 9 in.
Heating surface, fire-box	104 sq. ft.	120.2 sq. ft.	120.2 sq ft.
Heating surface, tubes	912 " "	911.7 " "	911 7 " "
Total	1,016 " "	1,031.9 " "	1,031.9 " "
Grate area	18 " "	15.13 " "	15.13 " "
Weight in working order	81,536 lbs.	84,200 lbs.	78,176 lbs.
Weight of tender in working order	45,920 lbs.	47,800	
Tender wheels, dia	36 in.	42½ in.	42½ in.
" " num.	six	six	six
" tank contains	2,112 gals.	1,440 gals.	1,440 gals.
Fuel space	120 cu ft.	170 cu ft.	170 cu ft.
Gauge of railway.	4 ft. 8½ in.	5 ft 6 in	5 ft. 6 in.

In the engine illustrated in Fig. 3 the slide bars are protected from dust by a hinged cylindrical casing.

It will be seen from the table that the compound engine for the Oude & Rohilcund is 6,000 lbs. heavier than the similar non-compound engine for the same line. This difference of weight, if correct, seems to imply some 8 per cent. extra amount of metal in the compound engine, and, therefore, about 8 per cent. extra cost. The saving in fuel, however, in these engines, as demonstrated in a month's actual working in India, is given below, both the compound and non-compound engines being as illustrated.

In January, 1886, the figures for three compound engines

running in the same service with three non-compound engines was as follows:

	Consumption of coal per mile. lbs.	Average mileage.
Non-compound	47.27	1,700
Compound	37.24	2,448
Saving	10 03	

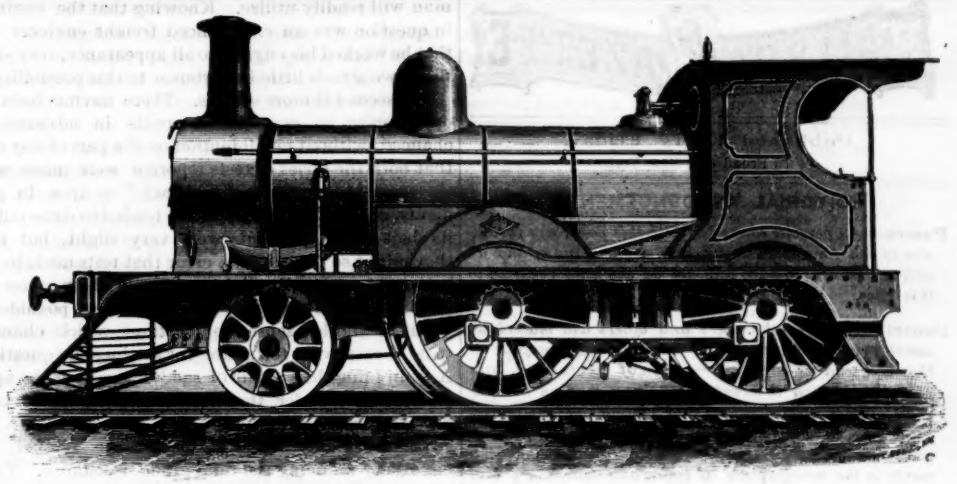
Taking the cost of coal per net ton at $5, the saving per engine per annum would be $784, a sum that would probably equal the extra first cost of the compound engine, which would therefore repay the extra capital outlay in the first years working.

The engine shown in Fig. 4 of our engraving is of the double-ender type built by Mr. Webb for use on suburban passenger trains, and for working branches with numerous sharp curves. A large number of simple or non-compound engines of this design having been working for some years, but the engine illustrated is the first of this class to which the compound system has been applied. The end carrying wheels at each end radiate, their lateral motion being controlled by springs. The saving of fuel effected by the use of the compound system has been very remarkable and seems to prove that the Webb method of compounding may be applied with advantage to engines working trains with frequent stops. The reason is that in starting with an ordinary engine the engineer is obliged to work with scarcely any expansion. In a Webb or Von Borries or Worsdell compound, he must always work with at least three-fold expansion. During the first month's running of the first of these engines their relative consumption of fuel was as under:

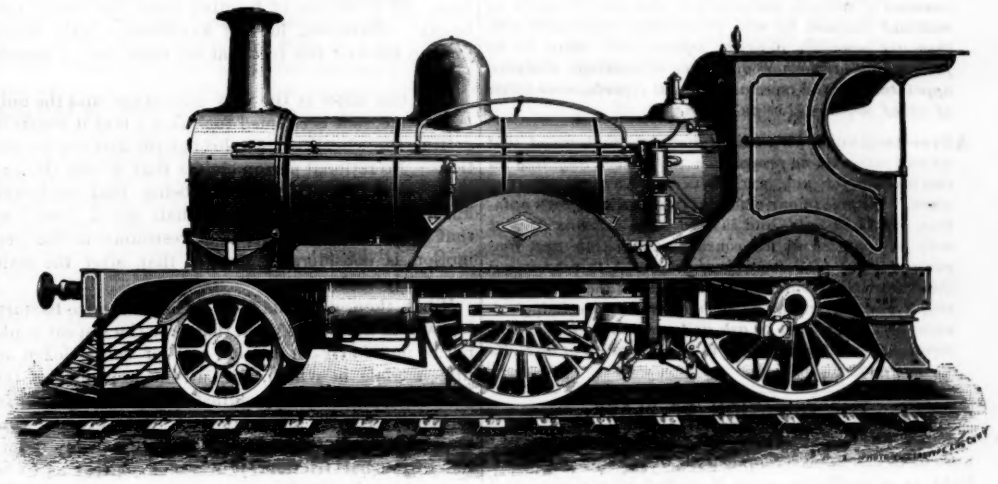
Non-compound	32.1 lbs.	per mile, average
Compound	23.3 "	" " one engine

The engines were precisely similar as regards heating surface, wheels, etc., differing only as regards the arrangement of cylinders and valve gear.

Compound engines are now running in France, Germany, England, Austria, Russia, South America and India with, we understand, a substantial saving of fuel in every case. Some trials of a compound locomotive in this country on the Boston & Albany, and of a tramway motor built by the Baldwin Works for New South Wales have not, however, shown any saving in fuel, while the additional weight and complexity are, of course, disadvantages. Both these unsuccessful compounds were, however, constructed on the Tandem principle, and could be worked compound or non-compound at the will of the engineer. When worked non-compound they would probably consume more steam than an ordinary engine, and thus neutralize the economy effected while working compound. This is possibly the real cause of their failure, which has not discouraged Mr. Downes, the Superintendent of the Sydney tramways, who is about to construct a *triple* expansion compound motor in the colony.



1. Non Compound Passenger, Oude & Rohilcund Railway, India. Built by Dubs & Co, Glasgow, Scotland.



2. Compound, Webb's System, Oude & Rohilcund Railway, India. Built by Dubs & Co, Glasgow, Scotland.

RECENT ENGLISH LOCOMOTIVES, COMPOUND & NON COMPOUND.

THE SCRAP HEAP.

Railroad Young Men's Christian Association.

The Association at Milwaukee published a monthly paper called *Sparks*, which gives some interesting items of news.

The library has been enlarged by the addition of some valuable works of reference of special interest to railroad men. The list will be increased hereafter.

A special meeting is to be held on one Sunday evening of each month in one of the city churches. The first meeting, on July 18, was largely attended.

An open-air song service on Sunday afternoons attracts many hearers. It is preliminary to the regular meeting in the rooms.

Moonlight.

"Moonlight nights—they are the bane of railroad engineers," remarked a head official of the Baltimore & Ohio Railroad last night. "All engineers dread moonlight nights. They try the nerves to their utmost. Engineers like to run on dark nights. On a moonlight night the trouble with them is no trouble at all—shadows. An engineer, looking out from his engine, sees before him all manner of shadows. He is sure that the dark shadow across the track he sees is a man or a rock, or some kind of an obstruction. He doesn't know, and he is kept in a state of nervous excitement all the time. Going around curves, along hillsides, many curious shadows are outlined on the track, and very often an engineer is so worked up over a night's ride that he is scarcely able to perform his duties."—*Pittsburgh Chronicle-Telegraph*.

The First Bay-Window Car.

Many passengers who pass through Saybrook inquire about an old passenger car which stands near the junction, and which has an ice-cream sign on its front. More than a quarter of a century ago the railroad, which was then known as the New York & New Haven Railroad, built three passenger coaches with bay windows. It was thought that these bay windows would prevent people from extending their heads out of the car, and thus prevent injuries to passengers. This object was accomplished, but the glass in these windows broke so often that repairs had to be made almost every day. Consequently, the three cars were discarded by the company and advertised for sale. The one at Saybrook Junction was sold for $225 to Mr. S. E. Hill of that place, and the others were subsequently sold for $500 each. The Saybrook car became a match manufactory about 20 years ago, and continued to be used for that purpose until the Valley Railroad was opened, when it was changed into a restaurant, and was used as an eating saloon until a restaurant was opened in the depot, when it was again converted into a shop for the manufacturing of matches, for which purpose it is now used. The timbers of the old car are still sound. It was No. 13 of the New York & New Haven Railroad.—*Hartford (Conn.) Courant.*

Why a New Yorker Wants a Pass.

General Freight Agent W. W. Finley, of the Texas & Pacific Railroad, received the other day the oddest request for a pass that is on record. It is from a New York man, who signs "M. D." after his name. The letter is as follows:

"Can I have a free pass over the Texas & Pacific Railroad and branches, with a view of explaining to the people methods of withdrawing water from the atmosphere by art? This is a matter of life and death to all organized beings on the earth, as the ice allowed to accumulate 'round the poles is crushing in the planet's solid crust to explode and conflagrate her. All self-luminous planets and suns are in conflagration. This means also the opening up of the deserts, and, in time, the polar regions, for settlement, and the wiping out of epidemics—social and others. If the tour be a financial success, I may refund the amount of transportation. When in Arizona, in 1878–9, I commenced the study, which has engrossed my attention since. Very truly, M. CAHILL, M. D.,

"239 East Twenty-second street, New York."

A Sensible Word for the Conductor.

It is all very funny for the railroad papers and the newspapers to crack jokes about conductors dividing their receipts with their employers and growing immensely rich on small salaries, but the question arises, Is it in good taste? Is it a good idea to implant in the minds of the traveling public a distrust for all conductors, to make the public believe by means of sly jokes and oft-repeated insinuations that every conductor is a thief? The *Times-Star* believes not. The *Times-Star* believes that dishonesty is no more prevalent among railroad conductors than among any other class of men. It has personal knowledge that there are at least a few conductors who would not rob their employers, but who, quite to the contrary, would defend the property of "the road" with the last drop of their blood. There are lots of brave, noble men that wear conductors' badges. Don't, for heaven's sake, make unthinking people believe that they are all disreputable rascals who stand ready at all times to commit that basest of crimes, rob those that give them their daily bread.—*Cincinnati Times-Star.*

Rules for Two.

A dilapidated-looking gentleman boarded a Broadway car at Chambers street yesterday afternoon, and stood on the rear platform with a much worn and evidently abused cigar stump between his lips. The dapper-looking little conductor glanced somewhat contemptuously at the dilapidated-looking gentleman's frayed olive green coat, his trousers, which had seen the light of better days, and the huge imitation ruby, which, if real, might have scintillated in Victoria's crown. The conductor said nothing until the dilapidated gentleman took a vigorous puff from the cigar stump, and opening his mouth blew forth a volley of smoke, the stale fumes of which penetrated into the car and caused a meek little lady to cough and look indignant.

"No smoking," said the conductor gruffly. "No smoking, I say."

The dilapidated-looking gentleman gazed with imbecile wrath at the conductor. But he pulled the cigar stump from his lips, held it between his weather-beaten, wart-covered fingers, and sat on the rail of the car, smiling at his thoughts. Onward went the car. It picked up two passengers only on its journey to Bleecker street, and at that point accelerated its pace. The dilapidated gentleman musingly put the cigar stump between his lips and allowed it to remain there. It was there for five minutes.

"No smoking, I said," angrily remarked the conductor at last.

"Who's smoking?" asked the dilapidated man.

"You are."

"I'm not." The dilapidated gentleman took the stump from his lips and showed it to the conductor. It was unlighted.

"I don't care," quoth the conductor, savagely. "Don't look as though you were smoking. Throw it away."

The dilapidated gentleman complied with this request. He jerked the cigar stump into the middle of the street, and cast one last long, lingering look after it. By this time every passenger save one had left the car. The conductor was warm. He wiped his brow. Then he leaned back upon the railing, pulled a crumpled newspaper from his pocket, and surreptitiously read it.

"Don't read," said the dilapidated gentleman viciously. "It's against the rules. You can't attend to your duty when you are reading. Put that paper away."

If a look could have withered the dilapidated gentleman, he had been instantly thus affected. The conductor grew crimson with indignation. But he put away the newspaper and said ne'er a word. There was still only one passenger in the car. The vehicle jolted onward until it reached Thirty-third street. Not a word was uttered by any one. The silence became so monotonous that the dilapidated gentleman looked about him for amusement. Presently the conductor again pulled the newspaper from his pocket and held it before his face, evidently to keep a scorching ray of sunlight from burning his flesh.

"Conductor," said the dilapidated gentleman, "I said no reading."

"I'm not reading," retorted the conductor, with a menacing look.

"You are."

"I'm not!"—furiously. The conductor pointed to the paper, which was turned upside down.

"I don't care," said the dilapidated gentleman, wrathfully, "don't look as though you were reading. Give it to me!"

The dilapidated gentleman leaned forward, tore the sheet from the conductor's hand, and before that injured being could recover from his surprise was a quarter of a mile down Thirty-seventh street.—*New York Times.*

A Frightful Affair.

They are telling an odd story about a party of dry goods men who went out to the Pines the other day in a two-seated carriage, and dealt so largely in goods that were not dry that they were unable to keep the road when they came back, and drifted off upon the railroad track at the first crossing. While they were bumping along home over the ties they caught sight of a train coming at full speed. Their terror at the sight sobered them all up in a minute, and the driver attempted to turn out of the track, but the wheels of the carriage were caught between the rails. The horses plunged and leaped, the pole was broken straight off, the dry goods men yelled with terror. The train came rushing down upon them—and whizzed by on the other track.—*Boston Evening Record.*

The First Locomotive in Indiana.

The mention in the *Herald* a few days ago that James Kinney was the first man who pulled a throttle on an engine through Columbus, on the Jeffersonville, Madison & Indianapolis road, brings out the following interesting reminiscence of the old Madison road. Our informant, who is one of the oldest railroad men in the West, states that a little Englishmen named James Jackson was the first man who pulled a throttle in Indiana. It was on Sunday, Nov. 28, 1838. The engine, the "Little Elkhorn," was brought up from Louisville, where it had been used on a road two miles long, from that place to Portland, and served for several years on the old Madison road. She took an excursion on the day named out about 8 miles from North Madison. The engine and her performance was the talk of the whole country, and people flocked to see her pass. Wm. K. Thomas was for many years a prominent citizen of Louisville, and was engineer of the "Elkhorn" while she was on the Portland road. The writer remembers an anecdote of this same little engine. An uncle of his was invited by Billy Thomas to take a ride down from Louisville to Portland and return. An old friend from the interior of Kentucky was with him, and they gladly accepted the invitation. They made the engineer promise not to run too fast when they got under way. They both said afterward that the staked and ridered fence seemed to be flying backward at a rapid rate, and when they got to Portland they were so badly scared that nothing would induce them to go back on her, but walked the two miles rather than tempt Providence again in that way.—*Columbus (Ind.) Herald.*

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

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THE QUESTION OF SLACK.

It is gratifying to those who feel compelled to discuss or to act upon live questions of the day with such light as is available, even if rather scanty, now and then to secure a piece of definite and positive information, and such a one was presented last week on the very live question of slack or no slack in couplings. Neglecting the considerable fraction who save themselves the trouble of decision by simply following in the wake of general practice, and the smaller fraction who are over-ready to form positive conclusions on slight evidence, a large proportion of the railroad men in responsible positions, who are not willing to do either of these things, will note the tolerably definite information brought out at the Burlington brake tests with genuine satisfaction.

It is one of the advantages of making any kind of tests thoroughly, that it is very apt to shed some light on other related questions, and indicate how to obtain more. This was conspiciously the case at Burlington, and the information which was obtained was by much the most definite which has as yet been made public, or which we believe exists. That it is absolutely conclusive and trustworthy, not only in substance but in degree, we are not prepared to assert nor hardly to believe, but it unquestionably goes a long way toward settling the question by proving that slack is in many ways more injurious than even has been claimed while its supposed advantages for starting trains are, if not non-existent, certainly very small.

If any one does not like this conclusion, or does not, believe it, it now behooves him to prove the contrary, or try to do so, by tests as careful as those at Burlington, and we sincerely hope some one will do so, for confirmatory evidence is desirable and contradictory evidence, if it can be produced, still more desirable. With the results of these tests in view, and knowing that they were made with intent and every care to get at the exact truth, we question very seriously if contradictory evidence, in any proper sense, can be produced. Certainly the tests as they stand may fairly be said to be sufficient to change the burden of proof from where it has heretofore rested, on those who have claimed that the prevalent practice and prejudice in favor of loose couplings for starting heavy freight trains was wrong, to those who maintain the contrary.

There are but three features of the tests, as reported last week, which leave any possible room for doubt. One is that no test which is made only by a single engineer with a single engine on a single train, however many times repeated, can be, in the strict sense of the word, absolutely conclusive. There is always the chance in such cases that the difference in individuals—the "personal equation," as mathematicians call it—may make one man lose an advantage which another man will readily utilize. Knowing that the engineer in question was an experienced freight engineer and that he worked his engine, to all appearance, very skillfully, we attach little importance to this possibility.

The second is more serious. There having been no opportunity to consult the profile in advance, it chanced, without any intention on the part of any one, that both the series of tests reported were made with the train hung over a "hog-back" or apex in gradients, so that the train naturally tended to draw out all its slack. The gradients were very slight, but that they might so far cause an error that tests made in the bottom of an equally slight sag would show some appreciable advantage from the slack is very possible.

But in another sense the locations which chanced to be chosen were fortunate for settling the question. A train hung like a pair of saddle-bags over the apex of a grade is under the most favorable possible conditions for starting easily. Every car-length it advances makes it easier to advance further, by materially reducing the total grade resistance. Even with the slight grades on which these tests were made, the advantage gained in this respect was equivalent to from 224 to 320 lbs. of tractive force for every car-length. Therefore, here, if anywhere, a little assistance in the first few feet that the train moved should tell.

Now this latter is the very advantage, and the only advantage, that is claimed for slack; that it assists in getting the wheels to turn through the first few revolutions. No rational person claims that it can do any more than this, the theory being that (as is well known to be the fact) the journals get a "set," so that their "friction of rest," or resistance to the first motion, is considerably greater than after the train gets fairly under way.

What, then, were the facts? The resistance to starting was in no case so great that even the last car could not be put fairly in motion out of some dozen or fifteen trials in which, with all the assistance of the grade, the train finally stalled after moving some 50 or 100, or even 200 or more feet, thus proving conclusively that in that distance, if there was any reduction of journal friction, it was not so great as to be noticeable. Even when the train was got fairly under way it barely crawled for the first 500 ft., and was in immediate danger of stalling in the first 300 ft.

This result is in curiously close accordance with the only tests on journal friction proper at these very low velocities that we know of, those made by Mr. A. M. Wellington, and described in a paper reprinted in these columns (May 22, June 5, July 25, 1885), from the *Transactions* of the American Society of Civil Engineers. In those tests it was found that, contrary to what is generally laid down in papers and articles on friction, there was no such thing in journal friction as a "friction of rest" distinct from and higher than the friction of motion, but that, so long as the velocity of revolution was very slow, the "friction of rest" continued indefinitely, without material diminution.

That this is true with railroad trains can never have been shown more conclusively than from the Burlington tests. The slack and the springs did perceptibly assist in getting the train under way for the first few feet, but after they had done it, and the slack was all out of the train, then, it was entirely evident, came the heavy pull on the engine, which was not materially different from or less than what it would have been in the first place with the slack all out of the train.

It is this which makes it seem so very doubtful if there is much in slack after all, despite the unquestionable theoretical advantage that the engine moves 3 or 4 in. further in starting each car, enabling it to do perhaps 5,000 or 6,000 ft.-lbs. more work on each one of them in the first few feet of motion, and despite such evidence as that presented in our issue of Nov. 6, 1885,*

* "The question of the importance or unimportance of slack in freight trains is one on which there is sufficient discussion and difference of opinion, but, as yet, a plentiful lack of experimental evidence. Superintendent J. M. Metheany, of the Grand Rapids & Indiana road, has recently done something to supply the latter, which he reports as follows:

"'An effort was made to see how many cars an 18 × 22 mogul engine could start on a grade of 20 ft. per mile with and without slack in the train, using sand freely and with all conditions favorable. It was found that taking advantage of all the slack possible in the ordinary way, by setting brakes on the rear car the engine could get under way with 56 cars. Taking out all the slack, so far as possible, by pulling ahead slightly with the rear brakes set up a little, letting off the brakes and waiting a few moments to imitate an ordinary stop, only 37 cars could be started.'

"If this result be accepted as accurate, it indicates that cutting out all aid from slack, except such as results from the natural elasticity of the springs, reduces the number of cars which an engine can start by one-third (34 per cent.), while if full advantage of slack be taken, 51½ per cent. more cars can be started than if it be not taken. We cannot but feel great doubt if the normal difference is as great as this single test seems to indicate. Still, it has its interest and value, as the result obtained in one test at least, and certainly goes to show that slack in freight trains can not be entirely dispensed with without injury. The great difficulty of making any test of the kind with strict correctness is known to every experimenter, and more valuable work could hardly be done, of its kind, than some accurate tests on this point. The conclusion sometimes drawn, that because passenger trains have been able to dispense with slack, freight trains will be likewise, does not necessarily follow."

and the widespread belief in its importance among practical railroad men.

The third and only remaining cause for doubt is that similar tests in cold weather might possibly give a somewhat different result. Not by any means to decrease the importance of the actual results, but simply to prevent over-positive conclusions being drawn from what is really somewhat imperfect evidence, we would caution readers that this is the most favorable possible season for starting large trains readily, and that it is entirely possible that tests in the middle of summer may give the results stated, and tests in the middle of winter, or even of spring or fall, might give quite a different result, to the extent of showing that the initial friction proper, and hence the slack, was of more relative importance in cold than in warm weather; just as it was entirely possible and proved to be the case that brake tests on 25-car trains might show one result, and tests on 50-car trains quite a different result.

But in this direction also the possibility of any serious error seems not very great, especially when we remember further than on one side of the question of slack, that of shocks and impacts with their attendant damages, the information given two weeks ago in our report of the tests is extremely decisive, probably going much beyond what even "I-told-you-so" prophets of the past would have ventured to claim in advance. With 50-car trains and emergency stops (in which the brakes are put on full at once, regardless of everything but stopping the train) we had the following:

The total free slack of nearly 4 in. was reduced by 3 in. by the wedges inserted, leaving 1 in. free slack and 7 in. spring slack in the train, even in the close coupling tests. Equating the latter as equal to half as much free slack, as in theory it should be, the slack available for starting trains was as 4½ to 7½ in., or 0.6 to 1.0. The result on impacts was:

	Ins.
With free slack of 7½ in. impact gauge moved.....	120
" 40 per cent. less slack (4½ in.) gauge moved only.....	20

That is to say, eliminating much less than half of the slack saved *five-sixths* of the impact. The simple little impact gauge did no more valuable work than to positively determine this. Unfortunately, it was not invented when the first and greatest shocks were received, so that the latter are estimated, but as 5 ft. impacts were received by it, which, in the judgment of those who have experienced all were not half as severe as those which preceded its invention, and as the original estimate of 20 ft. impacts has been reduced above to 10 ft. impacts, the figures given may be relied on as an understatement rather than an overstatement.

This means that the violence of the shock at the rear from a given check of speed at the head of the train increases considerably faster than the *square* of the amount of slack per car, or as the number of cars, the slack remaining the same.

If this only applied to shocks in violent emergency stops, it might not be so important, for they are the rare exception. But it is apparent that the same proportionate difference ought to, and presumably does exist in milder shocks, such as might not be sufficient to move the impact gauge at all, but which beyond question are sufficient to pull out weakened drawheads, break trains in two, and otherwise wrack the older and infirm cars which must naturally be found in most 50-car trains in service, but (it should be remembered) were not to be found in the Burlington test trains.

The same comparative difference which exists in cases of concussion may likewise rationally be expected to exist in the cases of sudden jerks in yards or in passing through sags. As a large proportion of the breakages are caused by these sudden jerks and shocks, rather than by gradual deterioration and wear, we are justified in believing that the elimination of all but about an inch of the free slack would reduce these breakages from shock very greatly, and possibly to a fourth or a fifth of their present amount.

This alone was a great victory for the principle of close coupling, and a tendency was observable at Burlington, which doubtless existed throughout the country, for those who strongly advocate it to throw up their hats at this point and regard the case as proved. This was far from the case; for freight trains, as we have said before, are not built to stop easily, but to start and to haul easily; to transport the maximum of load with the minimum of motive power. But when to the unquestionable advantages which the tests have shown close couplings to possess, as respects shock, is added the very strong indication that they are at no considerable disadvantage as respects starting trains, the duty of railroad men in the matter is clear: First, to eliminate all remaining doubt as to the substantial correctness of the Burlington tests, if

any exists, and then, failing such contravening evidence as is certainly possible, but seems now extremely improbable, to proceed to eliminate loose slack as quickly as possible, and thus save a very handsome sum in car repairs and loss and damage, as well as give increased safety to life and limb.

This will not necessarily imply the adoption of the "vertical plane" type of coupler, for the link type likewise admits of tolerably close coupling, although less perfectly and readily; but it will unquestionably give a great and just impetus to that type and decrease the importance of the mechanical question as to how the projecting knuckle will stand the impacts of service.

The evidence which the tests gave as to how and why the loss of slack is harmless must, we think, have been new to most of our readers, as it was to us. At least, it has been our fortune to see and hear the discussion of this topic by a great number of men on both sides of the question, and we have never yet heard any one adduce what these tests indicate to be the true reasons why slack is of small importance, nor describe correctly the behavior of heavy trains, started with or without it. The tests are so easily made that many may have done so, and refrained from giving the facts to the public, but this is not the first cause which has been defended by false arguments, yet afterwards proved a good one. The very common claim that because it was wrongly feared that slack could not be dispensed with for starting trains of ten or twelve Pullmans that therefore there was no reason to fear that it could not be dispensed with for starting trains of forty or fifty freight Pullmans we have repeatedly objected to, and the claim sometimes gravely advanced that doubling the speed of freight trains will be a compensation for cutting down the train load 15 or 20 or 25 per cent. is venturing on still more dangerous ground, which certainly has not been and probably cannot be shown to be safe and proper ground to stand on. Most of those who are found taking this ground have not made a study of nor been responsible for the economic and financial side of railroad operation. Those who have, almost to a man, listen to such a proposition with extreme apprehension.

But if, as now seems possible, by eliminating slack from freight trains we can greatly decrease the shocks, danger of breakages and breaks in two, and yet lose nothing in starting capacity, and if, by this advantage and that of a good power brake, freight trains can be fitted to maintain as high speed as desired on the level and descending grades which make up more than half of every run, an entirely different face is put upon the matter, and both advantages are gained at once. It looks now as if this might reasonably be expected.

THROUGH TRUNK-LINE FREIGHT IN JULY.

The trunk-line through freight movement in July last was large. The west-bound movement was considerably less than last year, but it was as large as in any other year, except 1884, and nearly the same as then; while the east-bound movement was the largest since 1881.

The total shipments eastward over the trunk lines from their western termini (Toronto, Buffalo, Pittsburgh, Wheeling, etc.), or points further west have been in July, in tons:

Year.	Tons.	Year.	Tons.
1880	1,141,649	1884	807,829
1881	1,084,548	1885	780,217
1882	780,067	1886	928,400
1883	699,378		

Last year there was an attempt in July to advance the grain rate from 15 to 20 cents per 100 lbs. from Chicago to New York, which was fairly successful in July, but failed later, and it was or account of this, probably, that the east-bound shipments were 101,000 tons less in July than in June. There were some irregularities in rates this year in July, but the average received was probably 5 cents per 100 lbs., or $1 per ton, more than last year; in spite of which we see that the east-bound shipments this year were 19 per cent. more than last year, 15 per cent. more than in 1884, 32½ per cent. more than in 1883, and 19 per cent. more than in 1882; but 14 per cent. less than in 1881 and 19 per cent. less than in 1880.

It is not easy to see what has caused the large increase over the four years previous. The grain and flour movement, which is the largest single item in the business, was, it is true, exceptionally large last July *to Northwestern markets*, but the Atlantic receipts were but little larger than last year, and considerably smaller than in 1884; the provision movement has been considerably larger than for several years, but not nearly enough so to account for the great increase in total shipments, and the other freight does not usually fluctuate greatly in quantity from one month or year to the other, and, moreover, the higher rates this year have tended to turn a larger share of the grain and lumber to the canal than for two years previous. The movement of grain from the West to interior Eastern points is included in these east-bound shipments, however, and of these there is no record, and they may have been unusually large, and the fact that the movement in the West was heavy and the receipts at the seaboard not heavy indicates (but does not prove) that they were unusually large.

Meanwhile the west-bound through movement over the trunk lines, including the shipments from New York, Philadelphia, Baltimore, Boston and a large number of interior points in New England going to or beyond the western termini of the trunk lines, have been, in July, in tons:

1880.	1881.	1882.	1883.	1884.	1885.	1886.
147,289	148,461	143,307	156,850	159,481	173,375	157,090

These west-bound shipments gauge the prosperity of the country much better than the east-bound shipments, but, of course, they do not gauge it exactly. They consist largely of imported goods and Eastern manufactures, the consumption of which certainly increases when the country is prosperous; but these are, after all, but a fraction of the goods consumed west of the trunk lines, and changes in the quantities obtained from the seaboard may be very great. For instance, the iron imported in 1880, 1881 and 1882 made an appreciable part of the trunk-line shipments westward, including great quantities of scrap going to Pittsburgh, etc. Now, the consumption of iron is as great as at any time heretofore, but a much smaller quantity is imported, and the shipments over the trunk lines from the seaboard (except from Philadelphia) are not likely to be as great as in some years of smaller consumption. Again, a considerable quantity of the New York shipments go by canal when rail rates are maintained; the only July when they were not maintained was last year, and, as we showed last week, the shipments from New York in July fell from 102,397 tons last year to 86,534 tons this year; that this was due to the diversion of canal freight last year is indicated by the fact that shipments from Philadelphia, Baltimore, Boston and interior New England points decreased only from 70,978 tons last year to 70,556 this year—that is, were substantially the same both years. Allowing for the effect of last year's low rates, therefore, we may say that the July shipments from the seaboard to the West have been substantially stationary for the last four years. This is not particularly encouraging, for in this country, where the population has grown as much as 8 per cent. since 1883, we should naturally expect some increase in this traffic, of which nearly every man in the country as far west as Buffalo and Pittsburgh takes a share.

When this traffic grew before, however, it was preceded for two or three years by a great growth in the east-bound traffic. Now this latter, until this year, had not grown since 1881, and it is still less than then. It may very well be that now, as then, the country will not buy largely until it has sold largely for a time.

For the seven months ending with July the east-bound shipments have been:

Year.	Tons.	Year.	Tons.
1880	6,258,785	1884	5,469,639
1881	6,306,741	1885	6,433,164
1882	4,934,246	1886	6,134,674
1883	5,480,352		

This movement is largely affected by the rates, as a large part of the grain which goes by canal when rail rates are as high as they have been this year, go by rail when carried for 15 cents or less per 100 lbs. from Chicago to New York, as in the last 6½ months of 1881, the first two months of 1882, the three spring months of 1884, and for about seven months last year. But for these very low rail rates the east-bound movement last year certainly would have been less than in 1880 and 1881, and this would have been the first year of a considerable gain in movement of through freight to the East—this including, it should be remembered, the supplies for all the territory east of Ohio, as well as what goes through to the seaboard. The gain over 1882, 1883 and 1884 is very large, and indicates a turn in trade of considerable importance, especially as the canal shipments have also increased.

For these seven months the through shipments from the seaboard to the West have been:

Year.	Tons.	Year.	Tons.
1880	1,088,905	1884	1,149,583
1881	1,078,475	1885	1,137,768
1882	1,455,317	1886	1,072,241
1883	1,079,809		

The decrease from last year is more than accounted for by the lower rates then prevailing, they being from 35 to 45 per cent. less than this year; but it remains true that the shipments this year were less than in any of the others when rates were nearly the same as they have been this year. The decrease is trifling, except from 1884; but this business was expected to grow, and under natural conditions it does grow. One of the unnatural conditions, however, is the excessive growth of it after 1879. Statistics for all the places were not kept then, but the New York shipments for these seven months increased from 411,364 tons in 1878 and 421,302 in 1879 to 588,204 in 1880 and 609,534 in 1881. With this growth of 48 per cent. from 1878 to 1881 it is not strange that this traffic should barely hold its own for some years afterward. It has been generally believed, however, that growth has begun again. There was a large increase in the last four months of last year, which gave a basis for this belief; but, as we have seen above, it has not continued. Perhaps it has only been interrupted, and that the fall trade will show a renewal of the gains of last fall; if so, we may see some signs of it in the August shipments, which are usually much larger than the July shipments.

New York Grain Receipts in July.

The grain receipts at New York last July were about one-fourth less than in June and a fifth less than in May, and the receipts by rail in July were less than in any other months of this year except April. In successive month the receipts have been (grain and flour), reduced to bushels:

	By rail.	By water.	Total.
January	4,788,230	50,060	4,838,290
February	9,561,883	46,580	9,608,463
March	10,080,676	175,474	10,256,150
April	3,523,872	254,879	3,778,751
May	6,912,671	4,647,373	11,560,044
June	6,031,529	6,426,193	12,457,722
July	4,661,740	4,525,849	9,187,589
Seven months	45,560,601	16,126,408	61,687,009

Compared with June, the decrease in rail receipts has been 1,370,000 bushels (22¾ per cent.), and the receipts by water 1,900,000 bushels (nearly 30 per cent.), so that the railroads suffered least.

The decrease from June to July does not have much significance, for July is usually a month of light receipts. For eight years the July receipts at New York (grain and flour) have been, in bushels:

Year.	Bushels.	Year.	Bushels.
1879	14,821,528	1883	9,638,168
1880	21,128,165	1884	9,630,093
1881	17,469,831	1885	8,778,017
1882	8,375,988	1886	9,187,589

Thus the July receipts this year have not been greatly exceeded since 1881, and are 4¾ per cent. more than last year; but, on the other hand, there have been but two years since 1877 when they were smaller, which is noticeable especially because, as we showed last week, the July receipts of grain at the northwestern markets this year have been exceeded but once in the history of the trade.

The receipts by rail and by water in July have been for ten years:

Year.	By rail.	By water.	Year.	By rail.	By water.
1877	1,733,095	4,496,954	1882	5,502,758	2,873,230
1878	5,365,107	5,678,886	1883	3,862,423	5,775,745
1879	8,757,397	6,064,191	1884	5,110,648	4,519,445
1880	9,433,891	11,694,974	1885	5,216,368	3,561,349
1881	11,821,431	5,648,800	1886	4,661,740	4,525,849

Thus the receipts *by rail* last July were smaller than in any other July since 1877, except in 1883, while the receipts *by water* were *larger* than in any other July since 1881, except in 1883. The percentage of the total receipts brought by rail in each year has been, in July:

1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.
27.8	48.3	59.1	44.7	67.6	65.7	40.1	52.1	59.4	50.7

Thus the rail receipts were more than half of the whole in every year since 1880, except 1883, but only very little more this year, and a smaller proportion of the whole than in any other year since 1878, except 1880 and 1883, these and 1882 being the only years when rates have been as much as 25 cents per 100 from Chicago to New York, in July.

While the total rail receipts last July were about equal to the average of the last five years, it must be remembered that they were brought by six railroads, while there were but three before 1883. It should not be necessary to say that the 4,662,000 bushels divided among six railroads this year has been much less important to any one of them than the 8,757,000 bushels in 1879, the 9,434,000 in 1880, or the 11,821,000 in 1881 divided among three railroads.

The rail receipts by each of the several railroads have been in July, in bushels:

Year.	N. Y. Cen.	Erie.	Penna.	Lack.	W. Shore.	Others.
1877	1,014,263	525,782	182,538	.....	.....	10,512
1878	3,240,864	1,141,024	982,213	.....	.....	21,066
1879	5,094,457	2,166,246	1,484,992	.....	.....	11,702
1880	4,926,958	3,226,378	1,262,005	.....	.....	18,550
1881	5,361,217	4,004,826	2,415,028	.....	.....	40,360
1882	2,010,376	1,737,468	1,702 772	.....	.....	52,142
1883	1,134,955	1,534,446	923,492	241,948	.....	27,582
1884	1,698,051	1,655,595	920,291	300 098	496,613	40,000
1885	2,037 865	1,679,412	688,364	289,732	474,7.9	46,246
1886	1,847,812	1,091,725	744,032	278,494	469,019	230,658

The shipments by the three old roads have been:

Year.	Bushels.	Year.	Bushels.
1877	1,722,583	1882	5,430,616
1878	5,344,101	1883	3,592,893
1879	8,745,695	1884	4,273,937
1880	9,415,341	1885	4,405,641
1881	11,781,071	1886	3,683,569

Thus these three old railroads brought to New York last July not one-third as much in 1881, not half as

much as in 1879 and 1880, and about one-third less than in 1878 or 1882. Their decrease from last year and the year before was to be expected, because rates were lower then than this year, and the total earnings from the shipments were probably the largest since 1882.

It cannot be said that the new railroads were very successful in securing grain last July, as altogether they brought then but 978,171 bushels, which is but 10.6 per cent. of the total receipts and 21 per cent. of the rail receipts, there being as many of the new as of the old roads. The 21 per cent., however, makes a serious impression on the business of the old roads, though it does not go far toward supporting the three new ones.

Compared with previous months of this year, the New York Central's share was unusually large in July, and so was the Pennsylvania's; while the receipts by the Lackawanna and the Lehigh Valley (the chief part of the receipts by "other" roads being by the Lehigh Valley) were very much less than usual, and by the Erie much less. The percentage by each road in successive months has been;

	Jan. and Feb.	March.	April.	May.	June.	July.	7 mos.
N. Y. Cen.	39.8	33.4	28.9	20.7	26.2	39.6	32.8
Erie	23.4	20.4	21.1	39.5	33.5	23.4	26.3
Pennsylvania ..	14.2	10.4	10.3	7.0	9.3	16.0	11.5
Lackawanna...	12.3	24.6	18.3	10.2	8.4	6.0	14.0
West Shore....	6 8	6.5	6.6	8.2	11.3	10.1	7 9
Other....	3.5	4.7	14.8	14.4	11.3	4.9	7.5
Total.. .....100.0	100.0	100.0	100.0	100.0	100.0	100.0	

The Erie had been taking much more than usual during May and June, and the distribution in July is less out of the ordinary course than it had been before, which may have been the result either of a better or a worse maintenance of rates. That is, those who were behind may have recovered their position either by cutting rates themselves or by other roads ceasing to cut—or both. There probably was no serious cutting, however, for if there had been, the railroads would have secured a larger share of the business and the canal rates could not have been kept so high as they were.

For the seven months ending with July the New York receipts have been, in *thousands* of bushels:

	1880.	1881.	1882.	1883.	1884.	1885.	1886
N. Y. C...28,145	24,691	18,119	19,381	16,834	20,512	14.956
Erie.....17,360	22,078	11,305	14.707	11.466	13 653	11,997
Penna 8,764	12,192	6,848	7,091	5,160	9,1:6	5,243
Lacka	.... ..	.... ..	2,837	2,777	4.090	6,276
W. Shore.	.....	.... ..	.... ..	2,629	6,322	3,585
Other. 463	750	506	400	400	521	3,404
Tot. rail..54,732	59,711	36,678	44,416	39.266	54,224	45,561
Coastwise. 1,769	1,930	1.527	2,203	1,406	1.474	973
Canal, ...30.611	18,150	11,241	15,624	11,223	10,385	15,153
Total..87,112	79,791	49,446	62,243	51,895	66,083	61,687

The total receipts were thus smaller this year than in any other of the seven except 1882 and 1884, but nearly the same as in 1883, and but 6½ per cent. less than last year, and above the average of the last five years (58,270,800 bushels). The receipts in 1878 (71,696,000 bushels) and 1879 (76,222,000), as well as those of 1880 and 1881, were very much larger than those of any subsequent year, however. The rail receipts this year were about a sixth less than last year, while the canal receipts were about one-half greater. More than half of the whole decrease in rail receipts has fallen on the New York Central, and most of the remainder on its leased line, the West Shore. These two together brought to New York 8,293,000 bushels (31 per cent.) less than last year, the total decrease in rail receipts being 8,663,000 bushels. The Lackawanna gained 56 per cent., and the "other" railroads 553 per cent., the whole of the latter, doubtless, due to the Lehigh Valley's entering the field as a grain carrier. The Erie's loss is comparatively small (12 per cent.), but the Pennsylvania lost 42½ per cent., which is proportionally more than the New York Central's decrease.

These figures for the seven months, it will be noticed, are very different from the July figures, which show the Lehigh Valley bringing 4.9 per cent. in July, against 11.3 to 14.8 for the three months previous; the Lackawanna 6 per cent. in July and 14 per cent. for the seven months; the New York Central 39.6 per cent. n July and 32,8 for the seven months, etc., the changes generally indicating that the traffic took its ordinary course in July more nearly than it had done previously.

The heavy wheat movement was not much felt at New York in July, but is likely to be more so in August, when the total grain movement is likely to be much larger than in July.

Useful and Useless Check-Chains.

In the discussion of the above question, which appeared in our issue of March 14, 1884, and again in Feb. 27, 1885, it was stated that what appeared to be needed was a sufficiently strong check of some kind (not necessarily a chain) to leave play enough for passing all curves encountered in regular service—which s very little—but to come to a bearing before the truck had slewed so far as to be beyond control, this slewing generally arising from a rotten or badly spaced tie, or other extraneous cause, the natural tendency of the truck, even when off the track, being to bounce along over the ties without slewing any further, often for considerable distances.

An incident of the Burlington brake tests recorded in another column illustrates this fact. Two separate derailments of a truck, at two widely separate points in the train, occurred at the same moment from the effect of a braking shock. In each case the trucks bounced along for 900 ft., and when stopped were still on the ties and close to the rails, so that both were replaced and the train off in 9 minutes.

In this there was nothing unusual; quite the contrary; only in this case it chanced to be matter of record. What prevented a wreck? Simply this: that the track was good enough and the distance short enough for no chance irregularity of bearing to give either truck a sudden wrench to one side. Had this happened to occur, the tracks might have slewed badly in an instant, and nothing could have prevented a wreck.

Now, the chances are that if, in such a case, there were something to restrain the beginning of a slew, the truck would probably bounce over the provoking cause, and thereafter, as before, continue to move parallel with the rails until the train was stopped. This could not always bring safety out of danger. It might not do more than save every second or third or fifth catastrophe. That it would in some cases be a safeguard and in no case be a danger was and is all that is claimed.

We received recently from an officer of a prominent line an informal personal statement that his company had made a test in the line of our suggestions, attached such short check-chains, derailed the rear truck of a car on a curve, dragged it slowly along over the ties and observed its tendency, and that the truck was slewed enough speedily to run off the ties. It was also observed that the short check chains of the front truck developed a tendency for the rear truck to pry the front truck off also, and the test was discontinued.

These are not the conditions of practice. We have not been so unforgetful of the short distance in which a turn-out curve leaves the main track ties as to imagine that a check chain could be so short as to prevent a derailed truck doing the same thing, if it tended to. We only claimed that it does not tend to. In an actual derailment at speed, if both axles are derailed, the truck usually follows the rails well for some distance until it suddenly leaves them, or begins to. A stout check-chain would often save this. If the front axle only be derailed, disaster follows almost instantly. A stout check would long postpone, and perhaps prevent this. If a rear axle be derailed, it will often trail all right for a long way as it is, and with a stout check to help it would be far more likely to.

The danger of one truck derailing another exists only with the rear truck of the train, since it is restrained elsewhere by the couplings, as it is with close couplings for the rear truck also. If the second derailment should be really caused by the rear truck, it is rather more likely to be on the same side of the rail than on the other side. If not, it can only occur by slewing the rear wheels back again, so that they will stand nearly parallel with the rails, and hence, thereafter track well on the ties; and it is better to have two trucks off the track on the ties, and likely to keep there, than to have one truck in the ditch.

Supposing we had a perfectly straight road: If all axles were fixed rigidly parallel one axle could not get off without a certainty of derailing others. Would the aggregate security against derailment be any less than with two independent swivelling trucks? The same contrast would appear to exist as respects allowing trucks more chance to swivel than is really necessary to enable them to pass the curves which they have to pass. An inch of lateral motion of the end of the arch-bars will enable an ordinary freight car to pass a 20-degree curve.

We should not be understood distinctly to advocate the use of such short checks. It is a possible safeguard, having sufficient *prima facie* merit to justify thorough investigation, even at the cost of smashing up a few old cars, and which has not been investigated. That is all we claim.

The Baltimore & Ohio and the Pennsylvania.

The Baltimore & Ohio has been able to get a share of the through freight shipped from New York by rail only by a contract with the Pennsylvania Railroad, which carried the freight for it between New York and Baltimore for a proportion of the through rate which was much lower than the local New York-Baltimore rate. Last week the Pennsylvania refused to carry this freight longer on such terms, alleging (it is said) that the Baltimore & Ohio had not adhered to one of the terms of the contract, which required that it should ship all its through freight by that road. The Baltimore & Ohio then arranged for the forwarding of its freight by a line of steam canal boats between New York and Philadelphia which use the Delaware & Raritan Canal, leased by the Pennsylvania with its New Jersey railroads. The freight had gone that way for a few days only when the Baltimore & Ohio says that the managers of the canal line declared that unless the Baltimore & Ohio would make a time contract for this freight, it, too, would charge local rates, which, it seems, are high enough with the trans-shipment at Philadelphia to make the route unavailable for New York shipments, and the Pennsylvania Railroad is charged with having compelled the canal line to take this action.

The wisdom of the action of the Pennsylvania cannot be judged without a more intimate knowledge of the facts than the public possesses. The Baltimore & Ohio apparently does not claim that it has exceeded its legal rights in the matter. It is not compelled to offer a through line to compete with its own lines to all roads that may connect with it anywhere west of New York, nor to carry out a contract which the other party to it does not abide by. But it was not compelled to make the arrangement in the first place, and no doubt entered into it because it seemed politic—because it would lose more if it did not give the Baltimore & Ohio a line to New York than if it did. If it did not, the Baltimore & Ohio would take freight by steamers from New York to Baltimore, and probably at rates such that the other railroads would suffer much more from it than by turning over to it the share of the business which it has actually had; and it would have been more likely to build a line of its own from Baltimore to New York—a consideration which may have had and ought to have had considerable effect on the Pennsylvania management. In spite of the use which it obtained of the Pennsylvania's line between New York and Baltimore, the Baltimore & Ohio set about building a line of its own, which is now completed so as to enter the market for freight at Philadelphia. This consideration, therefore, no longer has any weight; the Pennsylvania is going to suffer from a competing line whatever the privileges it may afford the Baltimore & Ohio now. The question now is, will it be likely to suffer more from the disturbance of rates likely to follow if the Baltimore & Ohio has to resort to steamers until it gets its line through Philadelphia than it will gain by keeping the Baltimore & Ohio out of an all-rail line? Taking all the trunk lines together, it is in all probability best for them that the Baltimore & Ohio should continue to take its percentage and that rates be maintained, but it is not so certain that this is best for the Pennsylvania, though we should think it probable. Months ago the Pennsylvania cut off the Baltimore & Ohio's passenger trains, and the resu t, we imagine, has not been favorable to it, though in this case it gets a large part of the Baltimore & Ohio's receipts for through tickets, as it will not for freight taken by steamers.

Meanwhile, there are no signs of any trunk-line war, as many seem to suppose. If the Baltimore & Ohio is forced to accept an inferior means of carrying freight from New York, it will be forced to accept less than the all-rail rates for carrying it, and will probably make rates low enough to secure considerable shipments, but it will certainly try to make them high enough to prevent any general break in all-rail rates, which would be disastrous to it as well as to the other roads. There is danger, however, in any such arrangement, especially as the new route would have to build up its business, and would be only a temporary makeshift. All the trunk lines strongly desire to keep business profitable, and there is little danger that any will recklessly endanger it, which of itself makes it improbable that there will be any war. In no event can the Baltimore & Ohio be kept out of New York more than a few months, and it is already in Philadelphia. No such struggle as that between the New York Central and the West Shore is possible, because no such result can be struggled for. It is a comparatively small business for a part of one year that is at stake, and nothing more.

July Earnings.

We have reports of July earnings from 25 more railroads this week, but only one of these, the New York Central & Hudson River, is a very important road, its earnings this year (including the West Shore's) being more than those of the other 24 roads. The comparison with last year is greatly injured by the inclusion of the West Shore's earnings with the Central's this year but not last. The earnings of the other 24 roads were:

	1886.	1885.	Increase.	P. c.
Earnings.....	$1,998,111	$1,867,000	$131.111	7.0

while the gain of the roads reporting heretofore was 18¼ per cent. But the New York Central more than brings up the earnings reported this week. For while we do not know precisely what the West Shore's earnings were in July last year, we know that for the three months, July, August and September, they were $1,101,931 and that July is the least favorable month for earnings in this quarter. But if one-third of these earnings were in July, then the combined New York Central and West Shore earned:

1886.	1885.	Increase.	P. c.
$2,077,626	$2,032,864	$644,762	31.7

And those of the 25 roads reporting this week were:

1886.	1885.	Increase.	P. c.
$4,930,536	$4,104,877	$825,659	20.1

which makes the July earnings of the 68 roads that have reported so far:

1886.	1885.	Increase.	P. c.
$23,486,115	$20,484,002	$3,002,113	14.7

This is certainly a very large gain. By far the larger part of it, however, has been made by the lines east of Chicago and St. Louis and north of the Ohio and the Potomac, which suffered greatly by the trunk line war last year. Of the $825,659 gain reported by the 25 roads this week, all but $80,512 was by these roads, and of the $3,002,113 gained by the 68 roads that have reported, $1,777,328 was by the lines east of Chicago and St. Louis, which as a whole did so poorly last year. Among them the Cincinnati, Washington & Baltimore gained 25½ per cent., the Indianapolis, Decatur & Springfield 35⅔, the St. Louis & Terre Haute Main Line 17½ and its Belleville Line 19 per cent., while the Illinois lines of the Illinois Central gained 12¾ per cent. The very heavy wheat movement in July doubtless made a great difference in the earnings of many railroads in this section.

The gain of the New York Central was much greater than in previous months of this year, the earnings having been (West Shore included this year, but not last):

	1886.	1885.	Increase.	P. c.
May	$2,542,622	$1,814,395	$728,227	40.1
June	2,664 245	1,972 915	691,330	35.0
July	2,677,626	1,665,554	1,012,072	60.7
Three months, April-June	7,570,411	5,603,634	1,966,777	35.1
Six months, Jan. to June	14,912,612	11,565,856	3,346,756	29.0

Thus the average monthly gain in the first three months of this year was $460,000; in the next three months, $655,000; in July, $1,012,000. But this was not so much because receipts were unusually large this year in July as because they were unusually small last year in that month. The July earnings were $13,381 more than the June earnings this year; they were $307,361 *less* last year. They increased greatly after July last year, averaging $2,193,930 for August and September, which makes it probable that the gains this year will not be so large hereafter as they heve been so far.

The Southern roads reporting this week have not all fared alike. Some have made large gains, as the Alabama Great Southern (18 per cent.), Cincinnati, New Orleans & Texas Pacific (14¼ per cent.), Southern Division of Illinois Central (22½) (8 per cent.), Western North Carolina (9 per cent.), the Vicksburg & Shreveport (22½ per cent.) (and St. Louis, Arkansas & Texas (late Texas & St. Louis) (54 per cent.), while the Richmond & Danville system lost in the aggregate and on three out of five lines.

The joint meeting of the Committee of the Master Car-Builders' Association on Freight Train Brakes and the brake representatives will take place in New York, Sept. 15, as noted elsewhere, not in December, as announced in the last issue of the *Gazette*.

The first railroad out of Buffalo, that between Buffalo and Niagara Falls, was opened just 50 years ago, on Sept. 7, 1836. Unlike most of the early railroads, it was designed more for passenger than freight traffic, and was primarily intended to enable visitors to see the Falls. At that time the Canadian shore of the Niagara River was thickly settled with a good highway, while on the American side but few clearings had been made. The railroad was therefore intended to divert trade from the Canadian side by affording a better access to the Falls. A few years after the line was opened, a train was run from Buffalo to the Falls, 22 miles, in one hour, a feat which excited considerable surprise at the time.

A careful perusal of our New York, New Jersey and Philadelphia exchanges gives us positive information that the Baltimore & Ohio is going to secure an entrance into New York by way of the Storm King Bridge, Suburban Rapid Transit Road, Weehawken Ferry, Delaware, Lackawanna & Western, Erie Main Line, Erie Newark Branch, New York & Greenwood Lake, New Jersey Central, Greenville and the Communipaw Ferry, Staten Island, with several other counties to hear from. The information in each of these cases is positive, and all the reports are deceptions, founded on the merest rumor. The reader can take his choice and be confident that he is right—until next week.

The rail grain movement from the West to the East has increased, but this is due chiefly to the movement of oats—presumably the new crop—for the shipments of wheat and corn by rail are very small, only 12.2 per cent. of the wheat and 17.7 per cent. of the corn shipped in the first week of August having gone by rail, against 88 per cent. of the oats, which latter made up more than two-thirds of the total Northwestern rail shipments. Oats are rarely shipped by lake, so that of the traffic for which the vessels compete, they still carry by far the larger part.

The flour shipments by canal have not amounted to much so far, the receipts at New York having been 3,793 barrels in July, 71 barrels Aug. 3, and 4,088 Aug. 5. The latter amounts to about two boat loads, and the indications are that the shipments were made as in experiment or with the hope of securing concessions from the railroads. Small as they are, they are much greater than usual for the entire season of navigation.

The Northwestern wheat receipts which, in the last week of July, were larger than ever before so early in the season, in the first week of August were nearly one-fourth less. About one-half of the whole decrease was at Toledo, which had extraordinary receipts the week before; but it nevertheless received more than any other place. Nearly all the remainder of the decrease was at Detroit and St. Louis, and these three winter wheat markets received about 69 per cent. of the total Northwestern wheat receipts in the first week of August, against 76 per cent. the week before, while Chicago received 20 per cent., against 15⅛ per cent. The change is toward the more usual condition of things at this season.

In spite of this decrease of a million bushels in the wheat receipts, the receipts of all grains at the Northwestern markets in the first week of August were but 118,000 bushels less than the week before, and were very large for the season.

The heavy wheat movement which has been manifest at the Northwestern markets since the Fourth of July, was not markedly noticeable at the Atlantic ports until the first week in August, their wheat receipts having been in successive weeks, in bushels:

Av. in June.	Week ending July 10.	July 17.	July 24.	July 31.	Aug. 7.
1,624,431	915,237	1,588,621	1,895,753	1,937,436	3,223,104

The sudden great increase in the last week is remarkable, when the wheat receipts were more than twice as great as in any week last year, and exceeded only once in 1884, after the largest crops were harvested.

The one-hundred pound rail which Mr. C. P. Sandberg has recently recommended, and which we discussed in our issue of June 25, seems to have commended itself quite widely. We learn from Mr. Sandberg that the Belgian State Railroad has decided to adopt it, while both the Dutch and the Danish State Railroad have decided to increase their section from 63 to 80 lbs., all within six months of the suggestion. The Grand Trunk of Canada is also considering a trial of it, and any of our leading lines which have sections subjected to heavy traffic could not do a more sensible thing, in our judgment, than to try a few miles of it likewise. While Mr Sandberg's section does not seem in all respects commendable, experience with a section of that weight would give a most valuable insight into what weight of rail was really most economical, by showing how a heavier as well as a lighter rail than was probably desirable would behave in service.

The first necessity before doing this, however, is to have some adequate basis for "rational tests for rails," as to which the best of our railroad companies are now so sadly in the dark. Otherwise the 100-lb. rail sections are not likely to do much better than lighter ones, which is badly enough. We learn with satisfaction that the tests suggested in our issue of June 11, 1886, are likely to be made the basis of experiment in Europe, if not in this country. Whether they have as yet been tried here we cannot say.

The Massachusetts Institute of Technology has made something of a departure in the usual course of engineering study at technical schools by establishing what is called a "railroad option," devoting more than twice as much time to the subject as heretofore, we are told, and also including a course of instruction in railroad management. This has been accompanied by the introduction of a number of other options, the whole being plainly in recognition of the increasing tendency to specialization in engineering, as in all other callings, so that a course of instruction in "civil engineering" is getting to be something of an impossibility if the student is to be prepared to start fairly in any one of its many branches, and not spread out his acquisitions of knowledge over so wide an area as to make them too thin for use. The studies of the first two years are common to all in the civil engineering course. It is in the third and fourth years that opportunity is given to specialize study by options.

All depends upon the way in which such a scheme is carried out, but in its substance the change would seem to be a good one and to be well planned, enabling each student to devote his time more fully to what is likely to be of direct use to him, and thus benefit him in a double way by increasing his interest in his studies, as well as improving their direction so that he will do more as well as more useful work.

In an address on "Railway Extension in the Colonies," in London, July 27, Mr. J. S. Jeans, Secretary of the British Iron & Steel Association, argued for the extension of railroads in India, Australia, Canada and other British colonies as at once making the mother country independent of the United States and Russia for its supply of breadstuffs and other food, and also as enlarging the market for English manufactured goods. He compares the area and population per mile of railroad in different countries; but though Mr. Jeans is regarded as a statistical authority, his figures for this country are very far out of the way, he having credited us with a mile of railroad to 2,300 inhabitants, while we actually have five times as much, or one mile to 460 inhabitants. "If Canada and India had to-day solved the railway problem as effectually as the United States has long since done," said the speaker, "if railway facilities were as abundant between the producers and the ports, and if the rates of freight were as cheap and as well adapted to the development of the trade, there would be no need for the dependence upon American supplies that now exists." He said that the low rates which growing traffic enabled our railroads to charge, made it possible for this country to compete with other countries, where it would otherwise have been impossible. "More than 70 million tons of agricultural produce were carried on American railways in 1880. On the transport of this traffic the agriculturists are paying now $150,000,000 a year less than they would have been required to pay at the rates of 12 years ago; and the effect of this has been that the agricultural exports of America have more than doubled in value and greatly more than doubled in value since 1870." This, Mr. Jeans said, has been the controlling factor, not only in the British imports of food supplies, but in the character and extent of the British agricultural depression.

If the British colonies had as much railroad as the United States in proportion to area, instead of the 30,000 miles that they now have, they would have 320,000 miles. He thought the colonies were justified in incurring debts (as many of them have done) for railroad extension, and the one that constructs most is likely to have the best start in the race for supremacy; which statement he should have qualified by saying that there is great danger of building too fast the railroads which eventually will be needed.

The London *Times* commented favorably on Mr. Jeans' address, saying that he had done much to show "that the chief element in the differential cost is the expense of transit in the country of production, and that the advantages possessed by America depend upon the completeness of the railway system, by which her growers are enabled to deliver their goods at the seaboard at the lowest possible rates of carriage—at rates which have not only been lowered by competition, but also, and probably in a still larger degree, by the patient study of every condition and arrangement by which the charges of freight can be diminished."

We suppose that it is to illustrate the dearness of English rather than the cheapness of American railroad freights, that the London *Times* mentions a statement of a correspondent who, having bought a heavy piece of furniture in Indianapolis and had it sent to London, found that the charges from Indianapolis to Liverpool were less by a third than those from Liverpool to London. We fear, however, that this does not prove that the English rates were high. There is no telling how little may have been charged by the American railroads, if there happened to be a railroad war at the time, and agents soliciting freight got their blood up over this furniture. We have heard of carrying cattle from Erie and Buffalo to New York for a dollar a car-load, and steamers have been known to pay for cargo—though "heavy pieces of furniture" are hardly the kind of freight they would be so eager to get.

Record of New Railroad Construction.

Information of the laying of track on new railroad lines is given in the current number of the *Railroad Gazette* as follows:

Atchison, Topeka & Santa Fe.—A branch is completed from Osage City, Kan., south to Quenemo, 18 miles. The *Arkansas River & Western* Branch is extended from St. John, Kan., west to Kinsley, 28 miles.

Chicago, Burlington & Quincy.—This company's *Burlington & Missouri River* line is extended from Ravenna, Neb., westward 34 miles.

Bay Ridge & Annapolis.—Completed from Annapolis, Md., to Bay Ridge, 5 miles.

Chicago & Northwestern.—The *Maple River* road is extended from Mapleton, Ia., west 8 miles. The *Huron-Columbia* line is extended from Columbia, Dak., north to Houghton, 11½ miles.

Denver, Memphis & Atlantic.—Track laid for 2 miles to a point twenty-eight miles west of Chetopa, Kan.; also from Conway Springs, Kan., west 14 and east 7 miles.

Fremont, Elkhorn & Missouri Valley.—Extended westward to Lusk, Wy., 26 miles. Track laid on the *Lincoln Branch* from Fremont, Neb., west to the Platte River, 6 miles.

Joliet, Aurora & Northern.—Extended from Plainfield, Ill., north by west to Aurora, 12 miles.

Lehigh Valley.—The *Bear Creek Branch* is completed from Bear Creek Junction, Pa., west to Meadow Run, 12 miles.

Minneapolis & Pacific.—Track laid from Minneapolis, Minn., west 21 miles.

Missouri Pacific.—The *Lincoln* Branch is extended west to Lincoln, Neb., 5 miles.

Ohio River.—Track laid from Point Pleasant, W. Va., north 7 miles.

Oregon Railway & Navigation Co.—On the new branch to Farmington, Or., 9 miles of track are laid.

Pennsylvania.—The *Schuylkill Valley Division* is extended from Hamburg, Pa., north by west to Schuylkill Haven, 14 miles.

Portland & Willamette Valley.—Track laid from Dundee, Or., north 6 miles.

St. Louis & San Francisco.—The *Winfield Branch* is extended from Cale, Kan., to South Haven, 16 miles.

St. Paul, Minneapolis & Manitoba.—The *Devil's Lake* line is extended from Blanding, Dak., west 40 miles.

Savannah Valley.—Extended northwest to Anderson, S. C., 10¼ miles.

Southern Pacific.—The *Northern Division* is extended from San Lorenzo, Cal., south by east to San Barnabé, 20 miles.

Wilmington & Weldon.—The *Wilson Cut-off* is extended from the Cape Fear River northeast to Rhodes, N. C., 12 miles.

This is a total of 344 miles on 19 lines, making in all 2,655 miles thus far reported for the current year. The new track reported to the corresponding date for 15 years has been:

	Miles.		Miles.		Miles.
1886	2,655	1881	3,459	1876	1,273
1885	1,472	1880	2,853	1875	613
1884	2,104	1879	1,746	1874	962
1883	3,078	1878	1,049	1873	2,025
1882	5,984	1877	1,013	1872	3,992

This statement covers *main track only*, second or other additional tracks and sidings not being counted.

NEW PUBLICATIONS.

The new *Poor's Manual*, which is the nineteenth annual issue of that invaluable work of reference, has 137 pages of introduction and 1,022 of reports, etc., while last year's issue had 35 of introduction and 1,008 of reports. The reports for the separate companies have been slightly abridged by the omission of the list of operating officers, for which we are referred to the new and much fuller "Directory of Railway Officials," which the proprietors of the Manual began publishnig this year; but otherwise the reports are of the usual form, but they are no longer presented in the order of the States, as they have been heretofore since 1877, which is a change very much for the worse, so far as convenience of reference is concerned, making it necessary to refer to the index for every railroad, while heretofore any one who used the Manual much and was familiar with the order of states adopted, and the states to which the companies were assigned which have roads in several states could turn at once to the company desired. We have found this arrangement very convenient, and the new one will be a great drawback to the usefulness of the work to us and to others who use it very frequently, who, it may be, are but a small proportion of those who use the book. In the new Manual the companies are arranged in no order whatever, unless it may be in the order their reports were issued and were compiled by the editor. For instance, the first report is that of the New York Central & Hudson River, followed by the Northern Pacific, Delaware & Hudson Canal Co., Newport & Wickford (R. I.), Orchard Beach (Me.), Evansville & Terre Haute, etc.

The general statistics for the whole railroad system of the country and for each state and group of states are contained in four pages of the introduction, which afforded the information for our article last week on "United States Railroads in 1885." This table has been improved in a very important respect by having a column for debt other than funded debt, and one for assets other than road and equipment (the chief of which consists of the shares and bonds of other companies). It is also improved by a new grouping of the states, which was formerly absurd, nearly three-fifths of the mileage of the country being included in one of five groups, called "Western," which took in everytning west of Pennsylvania, north of the Ohio and west of the Mississippi, from the Gulf to the British possessions as far west as Montana, Wyoming, Colorado and Texas. In the new arrangement there are eight groups, West Virginia having been transferred from the "Middle" group, where it never properly belonged, to the "South Atlantic" group, which is formed by dividing the old "Southern" group, putting Alabama, Mississippi, Louisiana, Tennessee and Kentucky into a separate group called "East Gulf and Mississippi Valley." The old "Western" group is divided into three—the "Central Northern" including the states north of the Ohio, west of Pennsylvania and east of the Mississippi; the "Northwestern" the states west of the Mississippi as far as Iowa, Nebraska and Wyoming on the south end, Montana on the west; the "Southwestern," those further south as far as Colorado, New Mexico and Texas, and the Pacific group, taking everything further west, as it did before, and New Mexico also, which does not belong there. This is on the whole a rational and convenient grouping, and much such as we have been accustomed to use. There are objections to it as there are to any grouping, as states belong together in certain relations and not in others, and one part of a state with one group and not with another. For railroad purposes it is difficult to separate Illinois and Wisconsin from the country west of the Mississippi, as the great Chicago companies have a very large part of the lines there; and in productions and markets Missouri and Kansas belong with the states north of them rather than with those south of them; but it would have been very difficult to make up any Southwestern railroad group which did not include Missouri.

Much more conspicuous in the introduction of the new Manual is a table of the dividends paid by every railroad company for eight successive years, together with the time and place of payment and the amount of stock at the end of 1885. This history of dividend payments is a fact of capital importance to investors, yet one which it is often very difficult to ascertain. People sometimes speak of a "6 per cent. stock," or an "8 per cent. stock," as if a dividend was something which has to be paid whether earned or not, and as if the rate paid one year fixed the rate for future years. But it may easily happen that the profits of several years go to make up a single dividend, which may be the last as well as the first. One of the first facts for the investor to learn, therefore, is whether the company has been able to pay, and has paid, dividends for a considerable period, whether they have been often interrupted, and whether they have increased or decreased in amount. This he could not easily ascertain in many cases. How many even of those familiar with stocks and with that particular stock can tell how many dividends have been paid by the Cleveland, Columbus, Cincinnati & Indianapolis Railway, and when they were paid? It seems remarkable that among all the helps to investors that have been published, this has not been clearly shown heretofore. The new Manual shows this important history of dividends for the last eight years at a glance.

There is also added to the Manual a table of the highest and lowest prices of the more active stocks and bonds at the Boston, Philadelphia and Baltimore as well as the New York stock exchanges in each month of the last eight years. This information is presented elsewhere in many publications, but it is very convenient and appropriate in the Manual, which is likely to be the only book of reference on such matters that many can have access to. This table of prices takes no less than 90 pages of the Manual, and the dividend table 12. They will doubtless add materially to the usefulness of this very useful book.

TRADE CATALOGUES.

The Watertown Automatic Engine is desbribed in a wel illustrated pamphlet issued by the makers, the Watertown Steam Engine Company, of Watertown, N. Y. The various advantages claimed are very clearly explained.

A Catalogue of Trucks and Baggage Barrows and a *Catalogue of Road Scrapers, Wheelbarrows, Etc.*, are two well illustrated publications just issued by the Kilbourne & Jacobs Manufacturing Company, of Columbus, O. A large variety of special forms of trucks, barrows and scrapers are clearly illustrated, with particulars as to size, weight and price.

The Garfield Injector Company, of Wadsworth, O., has lately issued a catalogue showing the construction and advantages of its Automatic Injector specially designed for railroad use.

The Westinghouse Electric Light Company, of Pittsburgh has issued a very tasteful pamphlet explaining the peculia merits of its special devices for electric lighting.

Injectors; Rue Manufacturing Company, Philadelphia. This illustrated catalogue gives particulars of the "Little Giant" and other injectors, including a form of fixed nozzle non lifting injector.

Special Tools for Railway Repair Shops is the title of a well-executed catalogue of the specialties manufactured by the L. B. Flanders Machine Works, Philadelphia. Many of these tools have been illustrated and described in these pages and are designed so as to be very useful to those engaged in the repair of locomotives.

The Kalamazoo Railroad Velocipede Company, of Kalamazoo, Mich., issues a neat illustrated catalogue of its specialties, including several forms of hand and push cars.

Steam Pumping Machinery in great variety is illustrated in a catalogue issued by Messrs. Guild & Garrison, of Brooklyn, N. Y.

The Railway Telegraph & Telephone Company, of New York, has issued a little pamphlet explaining its system of telegraphy by induction between fixed telegraph stations and moving trains or trains standing on sidings.

TECHNICAL.

Locomotive Building.

The Canadian Locomotive Works in Kingston, Ont., have received an order for 8 locomotives for the Canadian Pacific road.

The Schnectady Locomotive Works in Schnectady, N. Y., are completing an order for 10 locomotives for the West Shore road.

H. K. Porter & Co., in Pittsburg are building a locomotive to go to Yucatan in Central America. They have also on hand orders for 2 locomotives for a railroad in Venezuela, in South America, and one for the United States of Columbia, in South America.

The shops of the New Brunswick Railway at McAdam Junction, N. B., are building a new locomotive for the road, under charge of Master Mechanic G. A. Haggerty.

The Car Shops

The New Brunswick Railway shops, at McAdam Junction, N. B., are building a combination baggage and smoking car and a first-class passenger car for the road.

Bridge Notes.

The Phœnix Bridge Co. in Phœnixville, Pa., has taken a contract to build a new iron bridge over the Schuylkill River at Rockland, in Philadelphia. The bridge is built for the Philadelphia & Reading Railroad and will take the place of the old bridge built by the state and first opened for traffic in 1834. At that time the old Philadelphia & Columbia Railroad crossed it, and it was also used by the Philadelphia & Reading road. After the Columbia road was transferred to the Pennsylvania Railroad Co. the bridge was purchased by the Reading Co., and it has since been owned by that company. It has a passage way for vehicles and a footwalk, as well as the railroad tracks passing over it. The old piers and abutments are still sound and in good order and will be used for the new bridge.

Iron and Steel.

The converting department of the Edgar Thompson Steel Works at Braddock, Pa., last week turned out 5,010 tons of steel ingots, the largest output ever made at these works.

A company has been formed in Nashville, Tenn., to build two blast furnaces in the Sequatchie Valley. Dr. William Morrow and ex-Gov. Albert Marks are interested in the company.

Another company has been formed in Nasbville, Tenn., to erect a rolling mill and to build malleable iron works in connection with it. The capital stock will be $150,000.

Preparations are being made to start up the blast furnace of the Calumet Iron & Steel Co., at Cummings, Ill., and it will go into blast as soon as it can be made ready.

Lemont Furnace in Fayette County, Pa., has gone out of blast for necessary repairs.

Manufacturing and Business.

Velte & McDonald in Pittsburgh are making a machine for making car coupling links for the Pittsburgh Forge & Iron Co. The machine is a modification of one invented by J. H. Helm and extensively used for the manufacture of chains.

Messrs. Blackmer & Post recently made a shipment of railroad culvert pipe to Buenaventura, United States of Colombia, South America. The shipment went by the way of New York, Aspinwall and Panama. To Canada, Maine and the interior of New York state they have made late deliveries of several car-loads of pipe.—*St. Louis Age of Steel.*

The Iron Bay Manufacturing Co. in Marquette, Mich., has recently completed and shipped a hoisting plant with an engine of 150 H. P. to the Brook Pit Mining Co. of Bridgeport, Conn. This shipment of machinery from the West to a New England state is very unusual, and reverses the general course of business.

The Rail Market.

Steel Rails.—No very large sales are reported, but there is a continual demand for ordinary lots, and prices are steady at $34@$35 per ton at eastern mills. The Steel Rail Manufacturers' Association held its annual conference at Long Branch, Aug. 12, when it was decided to continue to work for another year under the existing agreement, when the allotment for the ensuing year was discussed and substantially fixed.

Rail Fastenings.—Prices are unchanged at 2.40 cents per lb. for spikes in Pittsburgh; 2.75@3.10 for track-bolts, and 1.65@1.80 for splice-bars. A good business is reported.

Old Rails.—The market is still very quiet, with quotations at about $19 per ton at tidewater for ordinary qualities. Old steel rails are higher, under the influence of a short supply and a considerable demand, and are quoted at $20.50@$23 per ton in Pittsburgh.

Machine vs. Hand-Cut Files.

The *Ironmonger* states that some trials have been lately made to test the relative superiority of hand and machine-cut files. Twenty-four files were made jointly by two firms, each file being machine-cut on one side and hand-cut on the other. Three files, one bastard, one second-cut, and one smooth, were then sent to each of eight engineering firms, who tested the files and made independent reports. In 10 cases the machine-cut side of the file was reported to give the most satisfactory results, in eight cases the hand-cut were found the best; while in five cases they were considered equal, and in one case the file was soft. Taking, however, smooth files alone, the hand-cut show a decided superiority. The tests were made on 12, 14 and 16-in. flat files.

The Baltimore & Ohio Station in Philadelphia.

The plans for the new passenger station of the Baltimore & Ohio Railroad in Philadelphia have been prepared by the architect, Mr. Frank Furness. The station, which is to cost about $100,000, is thus described by the Philadelphia *Press*:

"The lot upon which the new station will stand is bounded by Chestnut street on the north, Sansom street on the south, Twenty-fourth street on the east and the Schuylkill River on the west. Its dimensions are 230 by 238 ft. The tracks of the road running up along the Schuylkill will pass between the station and the river, and under the second arch of the Chestnut-street bridge, or northward, to join the tracks of the Reading. The east end of Chestnut street bridge will be used as an entrance to the station. The main portion of the building, which the passenger enters, will rise 67 ft. above the pavement of the bridge and 94 ft. above the bed of Twenty-fourth street. In the centre of the main entrance, which is near the northeast corner of the building, will rise an ornamental tower 140 ft. above the level of the street. Near the top will be a clock with a 4-ft. dial on each of the four sides. The building will front 173 ft. on Chestnut street and 110 on Twenty fourth street. The style of architecture is Flemish. The lower wall will be principally of iron, carried on iron columns and boxes, and the upper walls will be of brick, red-stone and terra-cotta. The string courses, cornices and brackets will be of terra-cotta, and the roof will be covered with red tile. Three graceful turret-like dormer windows will rise like miniature towers from the main structure west of the big tower. These will aid in lighting the great waiting-room in addition to enhancing the architectural appearance of the front. At the west end is a low tower surmounted by a gracefully sloping roof which overlooks the river. The station will be built 40 ft. south of the bridge, to which a platform will lead up. The space beneath the platform will be used for the reception and discharge of baggage. There will be entrances to the station from Twenty-fourth street on the ground floor, but the main entrance will be from the bridge. There will be two of these, one at the east end of the building and the other at the west. The eastern entrance will be 68 ft. wide, and will consist of two immense arches of wrought iron, with a large ornamental window between them. In front will be an ornamental carriage porch 68 ft. long and 20 ft. wide, with arch driveways. The western entrance will be a vestibule 38 by 20 ft. There are also entrances off the bridge to the third and fourth floors, where the offices of the company are to be located. The main floor, where the waiting-room will be placed, has been divided into half a dozen different apartments. The main waiting-room will be 119 by 38 ft. Immediately south and west will be the women's waiting-room, 48 by 63 ft., and the retiring-rooms. Adjoining the women's waiting-room are the restaurant, 40 by 50 ft., and the lunch bar, 40 ft. square. The rest of the space is taken up by serving-rooms, alcoves and elevators for passengers, baggage and employés. The ceiling of the main floor will be 20 ft. high. Tile walls and ceilings, with oak wainscoting, will be the features of the interior decorations. Graceful staircases will lead 20 ft. downward from the main floor to the basement. One will go down at the easterly entrance and end at the Twenty-fourth street end of the room below, near the ticket offices. Another will be at the southeast quarter of the floor near the ladies' waiting-room and end near the entrance to trains. A passenger who does not want a ticket can go down this staircase directly to the cars. On descending either of these stairways the passenger will find himself in a large waiting-room, 119 ft. long and 58 ft. wide, with a ceiling 27 ft. high. This room will take up almost the entire floor, and to relieve its dimensions from seeming barn-like the walls will be covered with glazed tile, and the ceiling will be handsomely decorated. Opening upon the waiting room will be the baggage, ticket and telegraph offices, news stand, package room, water-closets and elevators. An inclosed space, 30 by 170 ft., will lead to the train shed and tracks to the southeast of the depot. Passengers on arriving can either go out directly upon Twenty-fourth street, or they can take the staircases or the elevators and go upstairs and out upon Chestnut street. The third and fourth stories of the station, where the officers of the company are to be housed, will be admirably fitted for that purpose. A waiting-room for train hands will also be provided. The main operating-room of the Baltimore & Ohio Telegraph in Philadelphia will also be there. The kitchen of the restaurant will be on the third floor. The train shed, which will adjoin the station, will be 300 ft. long and 110 ft. wide. The foundations will be laid early in the fall."

Western Society of Engineers.

The 227th meeting was held at the hall in Chicago, Aug. 3, President Wright in the chair. A number of applications for membership were received.

Mr. Wright, referring to a paper read by him before the Society, Jan. 15, 1884, on the Rasmusen Cable System as Applied to Street Railroads, stated that an experimental section of 3,000 ft. in length of this system was being laid by the Chicago West Division Railway Co. A general discussion was had on the different kinds of street railroads and the motive power used thereon.

It was voted that 600 copies of the constitution and by-laws and list of members should be printed. The Society then adjourned.

Blast Furnaces of the United States.

The *American Manufacturer* (Pittsburgh) says: "We give this week our usual monthly statement of the condition of the blast furnaces of the country, giving in detail, by districts and fuels used, the number of furnaces in and out of blast Aug. 1, with the weekly capacities of the same.

"In a condensed form, the table makes the following showing:

Fuel.	In blast — No.	In blast — Weekly capacity.	Out of blast — No.	Out of blast — Weekly capacity.
Charcoal	63	10.980	154	15.910
Anthracite	119	33.602	90	20,172
Bituminous	131	77,460	89	31,796
Total	313	122,042	333	67,878

"As compared with July 1, there are 4 more charcoal furnaces in blast, with an increase in weekly capacity in blast of 560 tons, the same number of anthracite furnaces, but an increase in weekly capacity of 377 tons, and one less bituminous furnace in blast, with 545 tons less weekly capacity. With the exception of charcoal furnaces, therefore, the situation has practically remained unchanged during July. As the total increase in weekly capacity in June was but 1,000 tons, this indicates that the haste to increase the make of pig iron has received a temporary check, though we hear of several furnaces that will be in blast before Oct. 1, and others before Jan 1.

"The number of furnaces in blast and their weekly capacities on the first of each month since Jan. 1 is as follows:

	Charcoal. No.	Charcoal. Weekly capacity.	Anthracite. No.	Anthracite. Weekly capacity.	Bituminous. No.	Bituminous. Weekly capacity.
Jan. 1	57	7.804	104	29,811	112	59 4"6
Feb. 1	52	7 403	107	30,100	109	56.277
March 1	46	6.515	104	30 115	105	55.079
April 1	44	6.706	117	33.280	118	66,756
May 1	47	8,462	122	37,767	128	68,106
June 1	54	9,884	123	35,136	131	75,750
July 1	59	10,420	119	33,225	132	78.005
Aug. 1	63	10.980	119	33,602	131	77,460

"From this it will be noted that there has been a most remarkable increase in furnaces in blast and weekly capacity since Jan. 1, especially in bituminous—nearly 20,000 tons a week increase in capacity.

"On Aug. 1, 1885, the number of anthracite furnaces in blast was 77, with a capacity of 20,530 tons; of bituminous, 86 in blast, with a capacity of 44,845 tons."

A Steel Steamboat for the Hudson River.

The Homer Ramsdell Transportation Co., of Newburg, has awarded the contracts for constructing the proposed new steel passenger and freight steamer, "Homer Ramsdell," which is to ply between Newburg and New York as companion boat to the steamer "Newburg," recently constructed by Neafie & Levy, of Philadelphia. All of the work upon the steamer is to be done by Newburg parties. The hull is to be constructed by Thomas S. Marvel & Co., the engine and boilers are to be furnished by William Wright, of the Washington Iron Works, and the joiner work is to be done by Thomas Shaw's Sons. The "Homer Ramsdell" is to be 214 ft. in length over all, 33 ft. breadth of beam, 42 ft. over guards and 11 ft. depth of hull. She will be run by a vertical compound engine of 1,000 H. P., 26 in. high-pressure and 45 in. low-pressure cylinders, with a 36 in. stroke. She will be fitted with a propeller wheel of 10 ft. diameter, having a 15 ft. pitch. The steamer will have two boilers, each 9 ft. 6 in. in diameter and 20 ft. long, and she will be allowed to carry 100 pounds of steam. It is calculated that the engine will make 110 revolutions per minute. The steamer will have 108 staterooms, saloons, and officers' rooms, elegantly fitted up, and will be illuminated by electric light and heated throughout by steam. It is expected that the new steamer, upon which work is to be commenced at once, will make 20 miles per hour and be one of the fastest propellers on the Hudson, equaling the performances of the "Newburg" and the "City of Kingston."

A Tunnel from Sweden to Denmark.

Mr. Alexandre de Rothe, an engineer, who has been working at Panama under M. de Lesseps, has presented to the governments of Denmark and Sweden a project for a submarine railroad tunnel under the Sound between Copenhagen and Malmo. The tunnel is to have a total length of 12 kilometers, 3 between Amegar and the small island Saltholmen, under the Strait Drogden, and 9 between Saltholmen and Sweden. The ground to be worked much resembles that in the Channel between England and France, and is said to offer no difficulty to the execution of the work. The cost of construction is calculated to amount to 30,000,000f., or £1,200,000. The Swedish government takes a great interest in the plan, while the Danish at present is keeping somewhat back. Mr. de Rothe entertains sanguine hopes of a successful result of the negotiations. The tunnel would be of the greatest importance for the future commercial connection between Sweden-Norway, and later on of Russia and the whole continent, as loaded railroad wagons could then run from the north of Norway, Sweden, or Finland, down to the south of Italy.—*Copenhagen Letter in London Standard.*

A New Canal Boat Engine.

The new canal boat "City of Chicago," now on its first trip through the Erie Canal, has an ordinary propeller, its peculiarity being in the engine which furnishes the motive power.

The engine proper is all inclosed in the oblong drum in the centre of the room. This drum is a heavy cast-iron shell, 40 by 21 in., inclosing two cylinders, each 15 by 15 in. Each of the cylinders is inclosed by a jacket, and the space between it and the jacket is kept full of cold water. In the middle of the top of the drum is what is known as the fire-chamber, with valves opening into the cylinder. In this chamber is a perforated metal disk which is covered with a kind of wicking. This wicking is supplied with oil from a tiny supply-pipe that admits a few drops at a time. Another supply-pipe of similar dimensions admits the air from a neighboring tank. When the fire is to be started, a small lever at the side of the chamber is pushed to one side, disclosing a vent, to which the light is applied. There is no waiting to get up steam, for as soon as the fire is lighted the engine is ready to start. The cylinders are connected with the propeller shaft by cranks from the bottom. At the side of the engine rooms are the oil and air tanks. Of the former there is one having the capacity of 60 gallons. Of the latter there are three, two reserves and a working tank. A pressure of 90 pounds is kept on the air tanks. In the engine room are two long levers. By using one the boat is started ahead. By the other the engine is reversed, and when neither is touched the engine runs free without turning the propeller. The connection of the shaft with the propeller is by a friction clutch, which is thrown on or off by the movement of the levers. With everything in perfect condition, the engine running at full speed makes 112 turns of the propeller per minute. The pistons are driven by the expansion of the hydro-carbon gas precisely the same as by steam and not by the explosion of the gas. The gas exhausts into a large tank in the stern, which causes a hoarse, coughing sound.—*Albany Evening Journal.*

A Lake Freight Boat on a New Model.

The "Susan E. Peck," a new four-masted vessel built by the Detroit Dry Dock Co. at its Wyandotte yards, left yesterday morning for Escanaba on her first trip. The "Peck" was launched on July 29, and presents the novel feature, in a freight boat, of being an iron vessel except that the outside shell is covered with 6-in. oak plank, thus making her safer in case of striking the bottom or going upon rocks. The sides, however, are plated down 8 ft. from the top with iron, thereby giving all the strength of an iron ship, and all her internal parts, frame and keelson, are of iron. She is 238 ft. over all, 223 ft. keel; depth of hold, 20 ft.; beam, 37 ft., and carries 2,000 tons on a draft of 15 ft. She goes to Escanaba for ore. The "Peck" is owned by Capt. E. M. Peck, who personally directed all the details of her construction, and cost $85,000. A stern-pipe enters into her architure, and she is built with a view to ultimate remodeling into a steam vessel. On board are a boiler and steam-hoisting apparatus, which hoists the sails and works the pumps, thus rendering only a small crew necessary. Her cabins are nicely fitted up, and, altogether, the "Peck" is a model boat of her class, and marks an importance advance in the construction of composite freight vessels.—*Detroit Tribune, Aug. 8.*

New Passenger Cars.

The Boston *Herald* of Aug. 11 thus describes a new train just put on the Old Colony Railroad: "The train, as run yesterday, and as it is to be run regularly, consists of five passenger coaches, a parlor car and a baggage car, each of them being of the Old Colony standard length, 60 ft., and together they constitute one of the handsomest trains run out of Boston. The baggage car, No. 2, was built in the Old Colony shops in South Boston, and is similar to others already on the road. The passenger coaches are painted outside the standard dark Pullman color, and are ornamented with gold lines and modest designs. They are numbered respectively 262, 263, 264, 265, and 266, and are all alike outside. They are mounted on Pullman standard trucks, with Old Colony standard fittings, in order to keep all wearing parts of all the cars on the road uniform. They have 42-in. Paige steel-tired wheels and are furnished with French's springs. The cars are wider than ordinary, so that ample room is provided for two persons on a seat, and accommodations are furnished for 76 passengers. The inside finish is solid mahogany, with head linings of oak, the mahogany showing carved lines and neat designs, while the oak is decorated in an artistic manner. There are 20 windows on each side, 26 in. wide, arranged in pairs, and furnished with blinds. The seats have mahogany frames, the backs being provided with locks which prevent passengers unaccustomed to upholstered furniture from throwing them over in order to put their muddy feet upon the cushions. The seats are unusually broad, are provided with the Hale & Kilburn springs, and, with the backs, are upholstered in crimson plush. There are five double centre Adams & Westlake lamps, which have been adopted as a standard by the Old Colony, and the sides of the car have handsome bronze baskets of unique design. At one end of each car is a small retiring room, and at the opposite end is an apartment, zinc lined, in which the Baker heater is to be placed. One of the five cars has been fitted up as a smoker, the seats being upholstered in brown leather, and a number of tables being provided for card players. A convenient lavatory is also provided in the smoker.

"The parlor car, 'King Philip,' No. 267, from the shops of the Wason Manufacturing Co., of Springfield, is to form part of the train. It is mounted upon M.C. B. standard trucks, is painted a handsome carmine, ornamented with gold. It is the same length as the passenger coaches, and is finished inside with solid mahogany, the head linings being of maple veneer, laid off in panels by strips of mahogany. The main saloon contains 22 chairs, upholstered in crimson plush, while the smoking apartment has six chairs. Between the main saloon and the smoking compartment is a saloon and lavatory for gentlemen, and at the other end is a retiring room and lavatory for ladies and a closet for the Johnson heater. The windows are furnished with curtains, the floor is handsomely carpeted, and heavy French plate mirrors are placed at each end of the main saloon.

"The entire train is equipped with the Judkins train signal, the electric substitute for the bell cord, which is working so successfully on the Boston & Maine, Boston & Lowell and Boston & Providence (shore line) roads. Each car has six push buttons, four being inside and two outside. By means of these buttons, the conductor is enabled to instantly communicate with the engineer, a gong being located in the cab, and a code of signals for starting, stopping, etc., being provided.

"As stated on Sunday, this train, which, by the way, with its engine, represents an invested capital of $52,000, is to run in connection with the Fall River Line of Sound steamers, and last night took its regular place, leaving Boston at 7 o'clock and running through to Fall River without a stop."

THE SCRAP HEAP.

An Extraordinary Runaway.

A Long Branch correspondent in the New York *World* of Aug. 17, tells the following extraordinary story: "Great excitement was caused along the line of the New Jersey Southern Railroad, between this place and Sandy Hook, this morning, by the running away of a locomotive. Engine 402 stood on the track at Sandy Hook at 7:14 while Engineer Frank Kelly's back was turned. Suddenly the spectators noticed the engine moving slowly away. As the distance became greater the locomotive increased her speed, until finally she was going for Long Branch on the double quick. A telegram warned the officials at Long Branch that there was a runaway, and in a short time the track was cleared of all trains. When passing off the siding the engine struck a passenger car and carried away its water-tank. This did not check the speed of the runaway. Engineer John Truax and Conductor Kirby mounted engine No. 135 and started in pursuit. They overtook the runaway at North Long Branch, after making the run in 16 minutes. The two engines came together, and Truax, at great risk, passed from the pilot of his engine into the cab of the runaway engine and soon succeeded in bringing it to a stop. The water was almost entirely out of the boiler, the fire was raging in the furnace, and an explosion would have shortly occurred had the engine not been brought to a standstill. The tender was loose and the truck under the front end gone, so that the engine rested only on her big driving wheels. (?) Had the engine not been captured there doubtless would have been a collision further down the line and lives might have been lost. Engineer Kelly refused to explain how the engine got away, but the supposition is that the throbbing of the engine loosened the throttle and that the gradually increasing speed was due to its further loosening by the swaying of the runaway locomotive. This same engine was run into at Sandy Hook on Sunday and lost her pilot. She will be taken to the shops of the company for repairs."

Train Wrecking.

A Chicago dispatch of Aug. 17 says: "An attempt to wreck a passenger train was made on the Lake Shore and Rock Island tracks last night, but the perpetrators failed to accomplish their object. The attempt was apparently the work of the Lake Shore strikers and their sympathizers, but they made a mistake, the train belonging to the Rock Island, and not the Lake Shore road. It was the 10:30 train, bound for Omaha and Council Bluffs, and it had five coaches and two sleepers filled with passengers. It was probably mistaken for a Lake Shore train which leaves at 11:30. The train started off on time and stopped at the stock yards crossing, at Fortieth street. When it started up the cylinder head was blown off with a loud report, disabling the engine. Some miscreant had placed an obstruction, in the shape of a three-pound iron wedge, on the guide, near the cylinder head. The fireman of the engine had a good view of the man who did the mischief as he was escaping, and thinks he could identify him.

"While the train was waiting for another locomotive the Rock Island theatre train, loaded with passengers, passed on the main track. It was hardly 5 minutes before the Omaha train was ready and started off on the same track. Somebody had boarded the rear of the theatre train as it passed Thirty-seventh street, and had turned the red lanterns so the light could not be seen from behind the train, the intention clearly being to have the Omaha train, which was behind, run into the cars in front. The brakeman of the train in advance noticed a red light shining into the window, and going out on the rear platform discovered the trick. He turned the lights the right way as the train crossed Fifth-fifth street, and he was not a moment too soon.

"Superintendent Amsden, of the Lake Shore, said to-day that switches were being continually thrown, but the facts were never made public because the attempts to wreck the cars always failed. Lately, however, the occurrences have become more frequent than usual, the switches being thrown by the dozen. Monday night, a long train filled with dressed beef pulled out of Forty-third street. The efforts of the wreckers were bent on this train, for the cars were loaded with perishable freight. The train hands had orders to be particularly vigilant, and the train proceeded slowly. Several misplaced switches were encountered, but these were fixed before reaching them. One at Fifty-second street was somehow overlooked, and three cars ran off the track before the train could be stopped. The first truck on the first car was broken, and the cars had to remain on the track all night, but the others went on with but an hour's delay. When the cars ran off the track there was a crowd ahead cheering, showing that they had knowledge of what was about to occur.

"Early this morning Bernard Ferguson and Hiram Dennison were arrested just as they were in the act of turning the switch near Thirty-third street. The men were evidently going along the track throwing switches, for others in their wake were found misplaced. They were brought before Justice Meech, charged with malicious mischief and carrying concealed weapons, and were held."

Attempt at Train Wrecking.

A dispatch from Williamsport, Pa., Aug. 13, says: "An attempt was made last night to wreck the passenger train on the Philadelphia & Reading Railroad, due here a little after midnight. The attempt was made at a point three miles from this city. The switch had been turned, and a terrible disaster would have followed had the passenger train reached it before a freight train, which, coming ahead of the passenger train, was thrown off the track and several cars of coal were completely wrecked. The engine turned upside down. The engineer and fireman escaped almost miraculously. Passengers had to be transferred at the scene of the wreck."

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Cincinnati, Hamilton & Dayton, special meeting, at the office in Cincinnati, Aug. 26, to vote on the proposed issue of preferred stock to retire the outstanding bonds.

Housatonic, special meeting, in Bridgeport, Conn., Sept. 15, to vote on the lease of the Danbury & Norwalk road.

Nashville, Chattanooga & St. Louis, annual meeting, in Nashville, Tenn., Sept. 15. Transfer books closed June 16.

Northern Pacific, annual meeting, at the office in New York, Sept. 16. Transfer books closed Aug. 2.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago, Burlington & Quincy, 2 per cent., quarterly, payable Sept. 15, to stockholders of record on Aug. 23.

Delaware & Bound Brook (leased to Philadelphia & Reading), 2 per cent., quarterly, payable Aug. 17.

Iowa Falls & Sioux City (leased to Illinois Central), 1¼ per cent., semi-annual, payable Sept. 1, to stockholders of record on Aug. 14.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Master Car & Locomotive Painters' Association* will hold its annual convention in Chicago, beginning on Wednesday, Sept. 8.

The *Brake Committee* of the *Master Car-Builders' Association* will hold a meeting at No. 73 Broadway, New York, at 10 a. m., on Wednesday, Sept. 15.

The *Brotherhood of Locomotive Firemen* will hold its annual convention in Minneapolis, Minn., beginning on Wednesday, Sept. 15.

The *National Association of General Passenger & Ticket Agents* will hold its next meeting at the Hotel Brunswick in New York on Tuesday, Sept. 21.

The *General Time Convention* will hold its fall meeting in New York, on Wednesday, Oct. 18.

The *Western Society of Engineers* holds regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m. on the first Tuesday of each month.

Brake Test Meeting.

Mr. Godfrey W. Rhodes, Chairman, has issued the following notice, dated Aurora, Ill., Aug. 14:

"A joint meeting of the M. C. B. Brake Committee and the brake companies participating in the recent Burlington tests will be held at 10 o'clock a. m. on Wednesday, Sept. 15, at No. 73 Broadway, New York. At this meeting the rules laid down at Harrisburg for the endurance test and the April, 1887, test will be reconsidered."

All parties concerned are requested to inform the Chairman whether they can be present at this meeting.

American Train-Dispatchers' Association.

Mr. A. A. Zion, member of the Executive Committee for the Second District (Kentucky, Indiana, Ohio, Tennessee, Virginia, West Virginia, North Carolina, South Carolina and Maryland) has issued the following, dated Indianapolis, Ind., Aug. 10:

"The Constitution, as revised at the Chicago Convention, June, 1886, changes this Association from a *mass* convention to a *delegate* convention, on the basis of one delegate for every 10 members or fractional part thereof, of a district association. It is made the duty of the Executive Committeemen of each district to assign the territory, and grant the authority for the organization of district associations, and I take this means of encouraging action in that

direction. We have in this district 228 members, or over one-fifth of the entire membersl ip of the National Association. I desire and bespeak the earnest co-operation of each member to assist in organizing district associations, and ask each to use a personal effort to secure as many new members as possible. I am anxious to accomplish a thorough organization in this district, that will secure for us an increased interest and benefit that could not be obtained in a mass convention, and eventually result to the great advantage of the railroad companies in whose employ we are engaged. I trust that we will secure the largest number of delegates of any district in our next annual convention. In order to avoid any misunderstanding as to the objects of this Association, and to have each of the district associations to work in conformity with the laws of the National Association, all applications upon the Executive Committee for a permit to establish district associations or to be annexed to this Association, must be accompanied by a copy of the constitution and by-laws of the Association making the application. In order to secure a uniform time of holding the meetings of the district associations, I would recommend that meetings be held semi-annually, and that the second Sunday in the months of May and November be selected, where it is convenient for members to do so. By the members taking immediate action for the organization of district associations, there will be sufficient time left to effect the same, and be ready to hold the first business meeting in November next. The Secretary of each district (or local) organization already organized, is most respectfully requested to present this communication to the members at the next meeting of said Association, and on behalf of the American Train-Dispatchers' Association, I send greetings, and would be pleased to receive an application to be annexed to this Association. With the earnest co-operation of the dispatchers in this district, we will accomplish that which will result in great good to this department of the railway service and add materially to the successful and economical operation of railroads, and secure a uniform, less complicated, and therefore less hazardous system for the movement of trains by telegraph, and effect a unity of fraternal and social intercourse among the dispatchers that will elevate them to a higher social, moral and intellectual standing.

"Should any member or dispatcher desire a copy of our constitution and by-laws, or any other information, I would be pleased to hear from them."

Traveling Passenger Agents' Association.

The International Association of Traveling Passenger Agents held its annual meeting at Minnetonka Beach, Minn., Aug. 10 and11. It was decided to hold the next meeting at Old Point Comfort, Va., on the second Tuesday in June, 1887. There was a large attendance of members, most of them bringing their wives, and the meeting was a very pleasant one.

ELECTIONS AND APPOINTMENTS.

Alabama Great Southern.—Mr. A. Griggs, Master of Transportation, has been promoted to be Superintendent of this road, in place of Daniel McLaren, resigned. Headquarters at Chattanooga, Tennessee.

Atlanta & Hawkinsville.—This company has been organized with the following officers: President, John N. Dunn; Vice-President, Aaron Haas; Secretary, J. K. Brunner; Treasurer, R. J. Lowry; Chief Engineer, Henry L. Collier. Office in Atlanta, Georgia.

Baltimore & Eastern Shore.—Mr. W. H. Eichelberger, of Baltimore, is Engineer in charge of the preliminary surveys.

Baltimore & Ohio.—The following circular is dated Baltimore, Aug. 12:

"The Philadelphia Division will be opened for freight traffic on and after Monday next, Aug. 16. Mr. D. Connell is Division Superintendent, with headquarters at Wilmington, Dela ware."

Boston, Hoosac Tunnel & Western.—At the annual meeting in New York, Aug. 18, the following Directors were elected: Augustus Kountze, David J. King, W. H. Hollister, Francis Smith, James J. Higginson. James O. Sheldon, C. J. Lawrence, Charles F. Tay, S. V. White, Robert B. Minturn, Daniel B. Hatch, Rudolph Keppler, William Dowd.

Cape Fear & Yadkin Valley.—Mr. Robert Strange has been appointed Acting Master of Roadway in place of Col. W. H. Pryor, resigned.

Consolidated Rolling Stock Co.—The directors of this company are: Henry C. Coxswell, David N. Morgan, Wm. E. Seeley, Amos Staples, David Trubee, Bridgeport, Conn.; Walter H. Wesson, Springfield, Mass.; B. S. Johnson, Hudson, N. Y.; F. H. Mills, Detroit, Mich.; H. K. Ritchie, Montreal, Canada.

Duluth, Superior & Michigan.—The directors of this new company are: Elmer Barton, James Barton, John H. Hammond, W. V. Reed, Superior, Wis.; J. G. Deforest, F. H. Weeks, New York.

Illinois Central.—The following circular from Mr. D. B. Morey, General Freight Agent of this company's Southern Line, is dated New Orleans, La., Aug. 7: "Mr. Geo. W. Chellet has this day been appointed Assistant Freight Agent of this company."

International Association of Traveling Passenger Agents.—At the annual convention at Minnetonka, Minn., Aug. 12, the following officers were chosen: President, N. R. Warwick, Missouri Pacific; Vice-President, C. S. La Follette, Cincinnati, Indianapolis, St. Louis & Chicago; Secretary, H. C. Holabird, New York, Lake Erie & Western; Treasurer, J. A. Quinlan, Chicago, Burlington & Quincy; Orator for the next meeting, Charles E. Harmon; Executive Committee, W. W. Lord, Jr., A. G. Baker, Howard J. Ball, James A. Webb and Ed. F. Sierson.

Kansas, Colorado & Pacific.—The directors of this new company are: John Dean, Parsons, Kan.; E. B. Brown, John T. Harrison, Girard, Kan.; H. C. Drew, Indianapolis, Ind.; L. M. Potter, St. Louis.

Lake Shore & Michigan Southern.—Mr. J. W. Reinhart has been appointed Assistant General Passenger Agent, with office in Chicago. He was formerly General Auditor of the West Shore road.

Madison & Oshkosh.—The incorporators of this company are: Daniel Campbell, A. C. Parkinson, F. F. Proudfit and John H. Clark, Madison, Wis.; H. B. Harshaw, Oshkosh, Wisconsin.

Minnesota & Northwestern.—Mr. J. A. Hanley is appointed General Traffic Manager, with office in St. Paul, Minn. He was recently on the Minneapolis & St. Louis road.

Minneapolis & Pacific.—Mr. O. D. Hoffman is Chief Engineer, with headquarters in Minneapolis, Minn.

Napanee, Tamworth & Quebec.—At the annual meeting in Napanee, Ont., Aug. 9, the following directors were chosen: W. F. Hall, A. Henry, H. B. Sherwood, W. S. Williams, Napanee, Ont.; W. R. Aylsworth, F. S. Rathbun, Herbert B. Rathbun, Deseronto, Ont.; E. W. Benjamin, Yarker, Ont.; R. C. Carter, Kingston, Ont. The board elected Alexander Henry President; W. R. Aylsworth, Vice-President; W. S. Williams, Secretary; F. S. Rathbun, Treasurer; E. W. Rathbun, General Manager; R. C. Carter, Assistant General Manager; H. B. Sherwood, Superintendent.

Norfolk County.—The organization of this company is as follows: Joseph A. Parker President, Portsmouth, Va.; John R. Conkey, Vice-President, New York; Lewis Clephane Treasurer, Washington; Gurdon H. Wilcox, Secretary and General Manager, Washington.

Oregon Railway & Navigation Co.—At an adjourned annual meeting in Portland, Oregon, Aug. 12, the following directors were chosen: Elijah Smith, John H. Hall, Christopher Meyer, Colgate Hoyt, New York; William Endicott, Jr., Boston; Charles L. Colby, Milwaukee; C. H. Lewis, Henry Failing, W. S. Ladd, C. H. Prescott, C. A. Dolph, H. W. Corbett, D. P. Thompson, Portland. The only changes from last year's board are Colgate Hoyt in place of Brayton Ives, and D. P. Thompson, of Portland, in place of W. W. Ladd.

Pullman's Palace Car Co.—The following order from President George W. Pullman is dated Chicago, July 31:

"The position of Manager of the Pullman Car Works, Pullman, Ill., heretofore held by F. J. F. Bradley, having become vacant, all communications relating to the construction of cars should be addressed, Pullman's Palace Car Co., Chicago."

Richmond & Danville.—From Aug. 12 all communications for the General Manager and the Assistant General Manager of this company will be addressed to No. 1,300 Pennsylvania avenue, Washington, D. C., where their offices are now located.

St. Joseph & Grand Island.—The following circular from General Manager D. McCool is dated St. Joseph, Mo., Aug. 2: "William Lush is hereby appointed Chief Engineer of this company. He will have charge of all new construction and such other work as may be intrusted to him, and will report to the General Manager."

St. Paul, Minneapolis & Manitoba.—It is stated that Mr. John M. Egan will be appointed General Superintendent on Sept. 1. The appointment is intended to relieve General Manager Manvel of some of his present duties which are pressing too severely on him. Mr. Egan is now General Superintendent of the Canadian Pacific, and was formerly on the Chicago, Milwaukee & St. Paul road.

Texas & Pacific.—Mr. F. M. Alexander is appointed General Foreman of the car shops at Marshall, Tex., in place of K. A. Crosbie, resigned.

Transcontinental Bridge Co.—The officers of this new company are: President, William T. Martin, Natchez, Miss.; Vice-President and General Manager, W. D. Crane, New York; Secretary, J. S. Shields, Vandalia, La.; Treasurer, James Surget, Natchez, Mississippi.

Wabash, St. Louis & Pacific.—Chief Surgeon J. W. Jackson announces the following appointments: "Dr. Langler Whitney, former House Surgeon, is hereby appointed Surgeon-in-Charge of the Wabash, St. Louis & Pacific Hospital, at Springfield, Ill., to take effect Aug. 1. His orders will be respected and obeyed accordingly. Dr. F. L. Matthews, Surgeon-in-Charge, is hereby appointed Consulting Surgeon. Dr. A. E. Prince is hereby appointed Oculist and Jurist for the Eastern Division."

Wilmington & Weldon, and Wilmington, Columbia & Augusta.—The following circular from President R. R. Bridgers is dated Wilmington, N. C., July 26: "Mr. James F. Post, Jr., has been appointed Assistant Treasurer of the Wilmington & Weldon, and the Wilmington, Columbia & Augusta Railroads, and is authorized to sign letters, checks and drafts on behalf of these railroads, as follows: 'J. W. Thompson, Treasurer, per J. F. Post, Jr., Ass't Treas'r'. Appointment to take effect this date."

Union Pacific.—General Superintendent Smith announces that Mr. W. Y. Carlton has been appointed Assistant Superintendent of the Kansas Division and branches east of Brookville, vice E. Dresser, resigned.

Mr. S. B. Pratt (for the past 10 years Chief Clerk Motive Power and Machinery Department of the Western Division of the Wabash, St. Louis & Pacific at Moberly, Mo.), has been appointed Auditor in the General Storekeeper's Department at Omaha, Nebraska.

PERSONAL.

—Mr. Daniel McLaren has resigned his office as Superintendent of the Alabama Great Southern road.

—Colonel W. H. Pryor has resigned his offices as Master of Roadway of the Cape Fear & Yadkin Valley Railroad.

—Mr. J. A. Hanley has resigned his office as General Freight Agent of the Minneapolis & St. Louis Railroad, to accept a position on the Minnesota & Northwestern.

—Mr. Eli Whitney Blake, a mechanical engineer and inventor of the widely used stone crusher which bears his name, died at his home in New Haven, Conn., Aug. 16. He was 91 years old.

—Mr. Bradford Dunham, General Manager of the Baltimore & Ohio Railroad, was married in Baltimore, Aug. 11, to Miss Sophie Dunnington, of Baltimore. A large company of friends were present and the bride received numerous and valuable presents.

—Mr. K. A. Crosbie has resigned his position as General Foreman of the car repair shops of the Texas & Pacific road at Marshall, Tex. Mr. Crosbie is the General Foreman whose discharge of C. A. Hall, one of his subordinate foremen, was the cause of the great strike on the Missouri Pacific line.

—Mr. Samuel A. Hutchinson, Traveling Passenger Agent of the Union Pacific, has received a letter inclosing very flattering resolutions passed by the members of the New York Department of the Grand Army of the Republic. Mr. Hutchison took charge of and accompanied the New York delegation on the trip from Buffalo to San Francisco, to attend the yearly encampment there.

—Mr. H. N. Smith died suddenly of apoplexy at Hilbert Junction, Wis., while on his way from Marquette to Milwaukee. He was 66 years old and came to Wisconsin nearly 40 years ago. He was connected with the Milwaukee & Northern Railroad from its first commencement, and served for several years as President of that company. He gave up his official connection to become warden of the Wisconsin State Prison. He left the prison in 1880, and since then has been in business in Milwaukee. He retained his interest in the Milwaukee & Northern Railroad, and at the time of his death had just been to Marquette on business connected with securing the right of way for an extension of the road to that city.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Seven months to July 31:				
Ala. Gt. South...	$627,538	$589,702	I. $37,836	6 4
Bur., C. R. & No.	1,475,368	1,638,299	D. 162,931	9 9
Cin., N. O. & T. P.	1,547,222	1,430,588	I. 106,634	7.4
Cin., W. & Balt..	1,061 036	954,579	I. 106 457	11.1
Cleve., Ak. & Col.	287 871	275,591	I. 12 280	4.4
Col. & Cin. Mid..	168,772	102,888	I. 65,884	62 0
Col., H.Vy. & Tol.	1,242,872	1,257,266	D. 14 394	1 1
Des M. & Ft. D..	174,910	198,611	D. 23,701	11.9
Illinois Central:				
Ill. lines	3,455,917	3,512 288	D. 56,371	1.6
So. Division.....	2,039,017	2,346,950	D. 307 933	13.1
Iowa lines.....	891,257	883,831	I. 7,426	0.8
Ind., Dec & Spr..	219.699	181,102	I. 38,597	21.3
K. C., Clint. & S.	124 273	.....	.....	....
K. C., Ft. S. & G.	1,359,395	1,435,193	D. 75,798	5.3
K. C., Spr & M...	802 975	927.282	D. 124 307	13.4
N. O & Nor'east.	336,909	378 922	D. 42,013	11.1
N. Y. C. & H. R..	17,590.237	13,231,410	I. 4,358,827	32.9
Richmond & Dan.:				
Rich. & Dan Div.	2,160,699	2,127.850	I. 32,849	1.6
Va. Mid. Div....	811,529	821.022	D. 15,493	1.9
West. N. C. Div.	281,894	252,559	I. 29,335	11.6
South Car. Div	423,508	425,006	D. 1,498	0 3
Col. & Gr. Div..	334,729	349,434	D. 15,105	4.3
St. L., Ark. & T..	819,295	525,752	I. 293.543	55 8
St. L., A. & T. H.:				
Main Line.....	671,568	660,777	I. 10,791	1 6
Belleville Line..	387,793	402,604	D. 15,311	3.8
Vicks & Mer	269,342	227,695	I. 41 647	18 3
Vick., Shre. & T.	227,702	186,806	I. 40,896	21 9
Six months to June 30:				
Bur., C. R. & No..	$1,265,633	$1,413,918	D. $148,285	10 5
Net earnings ...	288,732	375,679	D. 86,947	23.1
Des M. & Ft. D...	159,812	169,280	D. 18,468	10.9
Net earnings...	25 237	37,133	D. 11,896	32.1
Dayton & Iron...	103,632	.....	.....	....
Net earnings....	*11,440	.....	.....	....
Mich. & Ohio.....	100 226	.....	.....	....
Net earnings...	2,744	.....	.....	....
Month of June:				
Bur., C. R. & No.	$218,124	$230,451	D. $12,327	5.4
Net earnings...	41,494	54 870	D. 13 376	24 1
Des. M. & Ft. D.	22,138	27,328	D. 5,190	15.5
Net earnings...	944	7,010	D. 6,066	86.6
Dayton & Iron...	14.083	.....	.....	....
Net earnings...	*5,492	.....	.....	....
Month of July:				
Ala. Gt. South...	$82.664	$70,092	I. $12,572	18.0
Bur., C. R. & No.	209.735	224,381	D. 14 646	6.5
Cin., George. & P.	5,228	2 969	I. 2.259	75.5
Cin., N. O. & T. P.	254,776	222 929	I. 31.847	14.3
Cin., W. & Balt..	150.820	120,104	I. 30,716	25.6
Cleve., Ak. & Col.	46 900	44,478	I. 2,422	5.4
Col. & Cin. Mid..	30.211	17,727	I. 12,484	7 1
Col., H.Vy. & Tol.	197,083	187.518	I. 9,565	5.1
Des M. & Ft. D..	24.068	29,324	D. 5,256	18.0
Illinois Central:				
Ill. lines	554 049	490,985	I. 63.064	12.8
South. Div.....	250,251	232,022	I. 18.229	7.9
Iowa lines.....	124.600	134,110	D. 9,510	7.1
Ind., Dec. & Spr..	39.080	28 749	I. 10,341	35.7
K. C., Clint. & S.	17,091	.....	.....	....
K. C., Ft S & G.	171,153	172,437	D. 1,284	0.7
K. C., Spr & M..	101,940	95,823	I. 6,117	6.4
Mexican National.	130,130	111,873	I. 18,257	16.3
N. Orl. & N. E ...	36,140	33,542	I. 2,598	7.7
N. Y. Cen. & H. R.	2,677,626	1,665,554	I. 1,012,072	60.7
Rich. & Danville:				
R. & D. Div....	271,400	272,277	D. 877	0.3
Va. Mid. Div..	125.784	130 570	D. 4,786	3.6
West. N. C. Div.	42 368	38,833	I. 3,535	9.1
South Car. Div.	46.700	45 982	I. 718	1.5
Col. & Gr. Div.	27,700	31,682	D. 3 982	12.5
St. L., Ark. & T..	134,361	87,593	I. 46,768	54.1
St. L., A & T. H.:				
Main Line.....	103,064	87,435	I. 15,617	17.5
Belleville Line..	62,859	52,817	I. 10,042	19 0
Vicks. & Mer....	26,899	19,990	I. 6,899	34.5
Vicks. & Mer....	31,127	29,574	I. 1,553	5.2
Vick., Shre. & P.	30,860	25,195	I. 5,665	22.6
First week in August:				
Buff., R. & Pitts.	$30,724	$24 858	I. 5,866	23.5
Cairo, V. & C.	14,838	9.830	I. 5,008	51.1
Canadian Pacific.	213,000	186.000	I. 27.000	14.5
Chic. & Alton....	167,016	166 321	I. 695	0.4
Chi. & N. W....	457 500	439 600	I. 17,900	4.1
C., St. P., M. & O.	98,600	94,800	I. 3,800	4 0
C., I., St. L. & C.	52 754	47,900	I. 4,854	10.1
Den. & R. G.....	133,308	127,067	I. 6,241	5 0
Illinois Central...	199,300	173,663	I. 25 637	14 7
Iowa lines....	30 500	23,588	I. 6,912	28.8
Long Island.....	97,721	97,189	I. 532	0.6
Louisv. & Nash...	272,925	236,040	I. 36,895	15.6
Mil. & Northern..	10,926	9,789	I. 1,137	11.6
Second week in August:				
Chic. & Atlantic..	$29,939	$22,352	I. $7,587	34.4
Chi. & East. Ill...	39,483	33 996	I. 5,487	16.1
Chi., Mil. & St. P.	408 000	378.736	I. 29.264	7.7
C., I., St. L. & C...	55,303	47,900	I. 7,403	15.4
Long Island.....	107,444	99,325	I. 8,119	8.2
Mil., L. S. & W...	56.966	29,020	I. 27.946	96 4
Northern Pac....	255,651	218,843	I. 36,808	16.7
St. Louis & San F.	94,400	70,200	I. 24,200	34.5

* Deficit.

Weekly earnings are usually estimated in part, and are subject to correction by later statements. The same remark applies to early statements of monthly earnings.

Coal.

Coal tonnages for the week ending Aug. 7 are reported as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Anthracite.....	668,053	611,171	I. 56,882	9 3
Eastern bituminous	244.561	193,214	I. 51 347	26.7
Coke.....	68,471	53,853	I. 14 618	27.1

The anthracite trade is quiet and the companies are reported as maintaining prices better than was expected. The bituminous trade is quiet also, with not much new business coming in, although shipments are large to fill old contracts.

Cumberland coal shipments for the week ending Aug. 14 were 76,763 tons. Total to Aug. 14 this year, 1,258,748; last year, 1,654,375; decrease, 395,627 tons, or 23.9 per cent.

Pennsylvania Railroad coal tonnage for the week ending Aug. 14 was:

	Coal.	Coke.	Total.	1885.
Line of road.....	141,404	60.462	210,866	206 427
From other lines.....	86.973	668	87,641	83,399
Total.....	228.377	70,130	298 507	289,826
Year to Aug. 14.....	7,070.278	2,076,267	9,146.545	8,221,209

Increase for the week, 8,681 tons, or 3.0 per cent.; increase for the year, 925,336 tons, or 11.3 per cent.

Cotton.

Cotton movement for the week ending Aug. 13 is reported as follows, in bales:

	1886.	1885.	Inc. or Dec.	P.c.
Interior markets:				
Receipts.....	7,536	2,518	I. 5.018	199.1
Shipments.....	8,624	3.707	I. 4.917	132 9
Stock, Aug. 13.....	48,719	20,066	I. 28,653	142.6
Seaports:				
Receipts.....	6,640	3,125	I. 3,535	114 0
Exports.....	12,957	21,236	D. 8.279	39.4
Stock, Aug. 13.....	205,572	168,831	I. 36,741	21.7

The total shipments from plantations for the crop year to

Aug. 13 are estimated at 6,476,560 bales, against 5,816,570 last year, 5,649,388 in 1883–84 and 6,964,344 in 1882–83.

Anthracite Coal Tonnage.

The shipments of anthracite coal for July and the seven months to July 31, as given by Mr. John H. Jones, the Official Accountant, were as follows, the statement including the entire production, excepting that consumed by employés and for steam and heating purposes about the mines:

	July.		Seven months.	
	1886.	1885.	1886.	1885.
Phila. & Reading.. ...	249.568	1 057,661	6.045.571	5,785.454
Lehigh Valley	437.828	562,482	3.249,798	2,918.038
Del., Lack. & West .. .	320 123	455 110	2.737,788	2,382 987
Del. & Hud. Canal Co...	266.050	278.187	1,935.254	1 589,154
Pennsylvania Railroad..	2>8,834	261,983	1,897,904	1,812,489
Pennsylvania Coal Co..	99,852	136,145	682,388	704,966
N. Y., L. E. & W..... ..	71,094	49,439	408 021	309,241
Total	2,443,349	2,801.007	16 956,724	15,502,329

Decrease for the month, 367,658 tons, or 13.1 per cent.; increase for the seven months 1,454,395 tons, or 9.4 per cent.

The division of tonnage for the seven months was as follows, comparisons being made with the corresponding period of last year:

	1886.		1885.	
	Actual.	Allotted.	Actual.	Allotted.
Philadelphia & Reading.....	35 65	37.61	37.30	38.85
Lehigh Valley	19.17	18.96	19.10	19 60
Del., Lack & Western	16.15	15.54	15 40	16.05
Del & Hudson Canal Co....	11.41	10.66	10.10	11.00
Pennsylvania Railroad Co...	11.19	10.45	11.70	8.00
Pennsylvania Coal Co	4.02	4 84	4.50	5.00
N. Y., Lake Erie & Western.	2 41	1 94	1.90	1.50
Total.....	100 00	100.00	100.00	100.00

The stock of coal on hand at tidewater shipping points, July 31, 1886, was 705,480 tons; on June 30, 1886, 700,736 tons; increase, 4,744 tons, or 0.7 per cent., during the month.

Demurrage Charges on Cars.

In the case of a complaint made by Peter Smith against the Atchison, Topeka & Santa Fe Co. before the Kansas Railroad Commission, it was represented that complainant had a quantity of corn at a station on the company's road, ready to be loaded as soon as sacks could be secured for it. The sacks had been purchased and shipped over the company's road, but owing to some unexplained delay, probably a great pressure of freight, they were seven days in transit for a distance of 58 miles. The shipper was consequently unable to sell his corn under a contract which he had made, and was subsequently obliged to sell it at a lower price. In addition to this, the company charged him $48 demurrage, or damage, for detention of the cars which had been sent to his station to load the corn.

The Commission in this case holds that the cars were really detained by the company's own fault in its unreasonable delay in forwarding and delivering the sacks, and that the shipper could not be held to be in any respect in fault. While recognizing the justice in many cases of demurrage or damage charges for detention of cars, the Commission considered that in this case the company had no right to impose any such charge, and decides that it should be refunded to the shipper.

Sault Ste. Marie Canal.

During the month of July the officers in charge of the Sault Ste. Marie Canal report that there were passed through the canal 1,295 vessels, the total registered tonnage of which was 780,707. These vessels carried 6,740 passengers and a total of 734,618 tons of freight. The principal items of freight were 379,185 tons of iron ore, 137,672 tons of coal, 257,351 barrels of flour and 2,451,163 bushels of grain. As compared with July of last year, there was an increase of 35 per cent. in the number of vessels passed through the canal and of 31 per cent. in the tonnage of freight carried.

Central Traffic Association.

A circular from Assistant Commissioner George H. Daniels, dated Chicago, Aug. 12, gives the following instructions as to the certificate plan for delegates to meetings and conventions to which special rates are granted:

"The Central Traffic Association has agreed that reduced rates for delegates and others attending conventions and assemblies shall be granted upon the certificate plan. For your information, a copy of the certificate is given on the reverse side of this circular. Supplies of certificates will be furnished you from time to time, as they may be required, by your General Passenger and Ticket Agent. When application is made to you for a certificate, you will require the applicant to purchase a first-class unlimited or limited ticket, and then, after he has written his name upon the face of the certificate, in the place provided for that purpose, you will find in the remaining blank spaces, sign your name as ticket agent, affix your office stamp and deliver the certificate to the passenger, with the ticket.

"A copy of the circular letter, which is used for the purpose of explaining to Secretaries of Conventions the method of procedure necessary to secure reduced rates under the certificate plan, is also given herewith for your further information.

"Certificates issued by the Central Passenger Committee will be accepted and honored same as those issued by the Central Traffic Association."

A meeting of this Association began in New York, Aug. 18. The first day was occupied chiefly with routine business. A committee was appointed to revise and report to the Association the amended contract prepared by Commissioner Blanchard.

Heavy Seashore Traffic.

The travel to the seashore Saturday and yesterday was very heavy—more persons going down to Cape May and Atlantic City than on any two days since the roads were established. The rush compelled the companies running to Atlantic City to borrow cars from other roads. On Saturday, 267 cars, averaging 60 passengers each, were sent down to Atlantic City by the Pennsylvania system. Of these, 128 cars left by the Camden & Atlantic road and 139 by the West Jersey & Atlantic. Yesterday, there were 53 cars sent down by way of the West Jersey & Atlantic and 37 by the Camden & Atlantic. Seventy-two well-filled cars went to Cape May. The Philadelphia & Atlantic City Railroad carried 115 car loads of passengers on Saturday.—*Philadelphia Ledger, Aug.* 16.

Western Passenger Rates.

Commissioner E. P. Wilson has addressed a letter to all members of the Northwestern, the Western, and the Southwestern Passenger Associations, in which he tells them that on Aug. 4, a letter signed by a large number of western general passenger agents was sent to the general passenger agents of the trunk lines, requesting them to take such decided measures as may be necessary to secure the following points, viz:

"1.—So far as may be, the issue of tickets to actual passengers only.

"2.—Restriction of such tickets to the actual destination of the passengers.

"3.—The stamping distinctly thereon of the actual date of sale, and the insertion of limits, not exceeding 24 hours more than the schedule time.

"You are requested to give such emphatic instructions to your ticket sellers as will prevent the issue of any tickets in blocks, or the cutting of any tickets in such manner as to enable them to be used to the disturbance of rates in the territory we represent.

"This is conveyed to you as the earnest expression of the wish of a number of your friendly connections and it is believed that as such, it will meet with such prompt attention as the circumstances seem to demand."

Mr. Wilson states that the trunk line officers have generally approved this letter and promised compliance with the requests.

St. Louis East-bound Freight.

A table prepared by Mr. E. W. Braisted, Chief Clerk in the office of Joint Agent De Pew, gives the destination of east-bound dead freight shipped from East St. Louis for the half-year ending June 30 as follows:

Destination.	Tons.	Per cent.
New York	21.427	15.4
Philadelphia	8,677	6.3
Baltimore.	11.945	8.7
Boston.....	20.221	14 7
Providence.....	2,594	1.8
Portland.....	1,498	1.1
Interior New England.....	36.957	26.9
New York State.....	10,192	7.4
Pennsylvania	7,603	5.5
Canada	3,321	2.4
N. J., Del., Md., Va., W. Va. and So....	2,808	2.1
Buffalo	5,732	4 2
Pittsburgh	4,184	3.1
Wheeling, Bellaire and Parkersburg....	535	0.4
Total..... ...	137.604	100.0

Of the total tonnage cotton formed 33.9 per cent.; grain and flour, 30.7; tenth class (pig lead, bullion, etc.), 13.7, and provisions 5.4 per cent.

The proportion of the total tonnage carried by the several lines was: Chicago & Alton, 21.3; Indianapolis & St. Louis, 13.4; Ohio & Mississippi, 17.4; Vandalia Line, 21.5; Wabash, 26.4 per cent.

Boston Traffic Notes.

In July the New York & New England road transferred across the Hudson at Newburg to and from the Erie, east-bound, 1,140 car loads of coal and 1,003 cars of other freight; total, 2,143 cars; and west-bound, 934 loaded and 1,238 empty cars; total, 2,172 cars.

West bound Passenger Rates.

The Baltimore & Ohio Co. is now vigorously cutting rates on passenger business from New York westward, and at latest accounts was selling tickets to Chicago at $13, first-class. Out of this the company is obliged on New York tickets to pay full fare over the Pennsylvania Railroad from New York to Baltimore.

Trunk Line Executive Committee.

The Trunk Line Executive Committee met at Commissioner Fink's office in New York, Aug. 18, with a full attendance. The first day was devoted entirely to routine business. The meeting is expected to continue for several days.

RAILROAD LAW.

Commutation and Mileage Tickets—Right to Enforce Contract.

In the case of the Norfolk & Western Co., appellant, against Wysor, just decided by the Viginia Supreme Court, Wysor was holder of a 2,500-mile ticket and took passage on a train over the road. He refused to allow the conductor to detach coupons from his ticket, insisting that coupons which he had himself detached should be received, although the regulations required that the conductor should detach them. He was put off the train and brought suit for damages in the Circuit Court, where he was awarded a judgment for $500. The Supreme Court now sets this verdict aside, nolding as follows:

It is well-settled law that a carrier has a right to make reasonable rules and regulations for the conduct of its affairs, and that they are binding upon the passengers and the public dealing with the carrier when brought to their notice, provided, always, that these conditions and regulations and instructions are kept within the rule which prohibits, upon principles of public policy, certain conditions or contracts to be made exempting carriers from liability for negligence or for failure to comply with obligations and duties to the public imposed by law.

The reasonableness of the rules and regulations of a railroad company is a question of law addressed to the courts. The regulations and rules of the defendant company as contained in "instructions to conductors" are reasonable and do not interfere with or infringe any rights of the plaintiff belonging to him in common with others, to be carried safely, peaceably and comfortably, and with convenient dispatch over the company's roads. It was the clear, explicit and expressed intention and agreement of the plaintiff and defendant, at the time the contract of carriage was entered into, that the conductor should detach the coupons for the number of miles the plaintiff informed him he intended to travel, and the conditions and stipulations of the special contract of carriage—"coupons not good for passage if detached;" "conductors will detach coupons," etc.; "coupons from this book must not, under any circumstances, be accepted for passage *if detached*"—were made to prevent imposition and fraud upon the company, and as a reasonable and necessary instruction of the railroad company to its conductors as to what shall be evidence to them of the right of the holder of the commutation ticket to be a passenger upon its trains and to enjoy the rights and privileges of a passenger at the reduced rate of fare; and the plaintiff expressly agreed to present the book or ticket to the conductor as a whole, so that he could comply faithfully and obediently with the orders of his superiors; and it was a plain violation of his contract for the plaintiff to detach the coupon and to demand that the conductor should receive it in a mutilated form. The plaintiff says that he knew all about these rules and regulations, and read them before he signed the contract; and without this condition, that the conductor should detach the coupons, and not the holder of the ticket or book, the company would not have made the contract with the plaintiff. If he had insisted or even intimated, before the ticket was delivered to him, that this condition or rule should be expunged, or he would not sign the contract, then he could not have purchased the ticket. The company would have had the absolute right to have refused to sell the plaintiff this commutation ticket if he had insisted upon the right, as he now does, to detach the coupons; and there is no power to compel the company to sell these tickets at reduced rates, except upon such terms and conditions as they choose to make with the buyers of them. The railroad company has the right to make these reasonable conditions; and the violation or any of these conditions forfeits the right of the holder of the ticket to be carried as a passenger upon the terms of the ticket, and he may be expelled from the train by the conductor without any liability for damages upon the company, provided that no unnecessary force be used. * *

The verdict of the jury is for excessive, punitive and exemplary damages, and it should have been set aside by the Court. Such damages be ong alone to actions of *tort*; and there is no evidence of a wilful and malicious purpose or intent by the company or its servants to wrong or injure the plaintiff, or of any neglect of duty to the public, or of negligence or indifference; but, on the contrary, the evidence is full and conclusive that the plaintiff got upon the defendants' train, expecting to be expelled, and so conducted himself as to compel his expulsion from the train, with a view of suing the company for a wrongful expulsion, with the systematic and persistent design of making money by his self-sought and self-inflicted martyrdom. He must take nothing by his false clamor. Enlightened policy as well as a sound and impartial administration of justice will, while railroad companies as carriers are held to a strict performance of all their difficult and dangerous duties under the law, shield them from excessive and oppressive verdicts when they are not in fault. The verdict of the jury in this case must be set aside, the plaintiff's declaration be quashed and the judgment of the Circuit Court be reversed and annulled, with costs in favor of the plaintiff in error.

OLD AND NEW ROADS.

Atchison, Topeka & Santa Fe.—This company is actively prosecuting the work on several of its extensions in Kansas. The Arkansas River & Western line has been completed from Hutchinson, on the main line, westward to Kingsley. This line is 75 miles long and is a loup connecting the two points on the main line and shortening the distance 23 miles. It runs straight across the chord of the arc formed by the old line, which follows the course of the great bend of the Arkansas River. The new line also opens up some additional territory.

A branch has also been completed from Osage City, on the main line, southward 18 miles to Queneno on the Emporia Branch of the Southern Kansas Division. This branch is 18 miles long.

Atlanta & Hawkinsville.—This company has completed its organization, and the directors intend making arrangements to begin work as soon as possible. The projected line is from Atlanta, Ga., to Hawkinsville, and the object is to secure an independent line from Hawkinsville to a navigable river.

Atlantic & Northwestern.—This company, which proposes to build a railroad from some point in the western portion of South Carolina to the Atlantic coast, has offered to make its coast terminus at Smithville, N. C., provided it receives a bonus of $100,000 in town or county bonds.

Baltimore, Birmingham & Gulf.—This company has been organized in Alabama to build a railroad from Dalton, Ga., southwest to Birmingham, Ala., and thence to Mobile. It is proposed to take in the line of the Mobile & Alabama Grand Trunk as part of the projected road.

Baltimore & Eastern Shore.—At a meeting of the directors in Baltimore last week the Executive Committee was authorized to go on and secure the right of way. The plan showing the location of the road was submitted and approved. The line adopted extends from a terminus on the Chesapeake Bay, across the Eastern Shore, through Easton, to Salisbury, Md., where connection will be made with the Wicomico & Pocomoke road, which runs from Salisbury to Ocean City. The length of the proposed new road from the bay shore to Salisbury will be 52 miles, and it will make a line running diagonally across the Eastern Shore to Ocean City, 82 miles in length. From the proposed terminus on the bay shore the distance across Chesapeake Bay to Bay Ridge is 12 miles, which will be covered by a ferry, and at Bay Ridge connection will be made with the new Bay Ridge & Annapolis road, over which trains will run to both the Annapolis & Baltimore Short Line and the Annapolis & Elk Ridge road. The money to build the new road will be raised partly by stock and partly by the issue of bonds. The city of Baltimore will be asked to indorse $500,000 of the bonds, and the four counties of Wicomico, Dorchester, Talbot and Carline £50,000 each. The object of the new road is to preserve the business connection of Baltimore with the Eastern Shore country. That business has been largely diverted to Philadelphia of late years, through the control of the Eastern Shore Railroad by the Philadelphia, Wilmington & Baltimore.

Baltimore & Ohio.—It is stated that the traffic contract with the Central Railroad of New Jersey has been finally agreed upon and approved by the directors of both companies, but not yet signed. The agreement is a joint one, the Baltimore & Ohio and the Central Railroad Co. of New Jersey and the Philadelphia Railroad Co. being parties to it. It provides that the Baltimore & Ohio Co. shall have the use of the Central Railroad tracks from Bound Brook to Elizabethport for all its business, both passenger and freight. The Central Co. agrees to interpose no objection to the building of a bridge over the Arthur Kill or the use of the Staten Island terminus by the Baltimore & Ohio; but for two years from the date of the execution of the agreement all freight business is to pass over the Central tracks to Jersey City. Under this agreement the Baltimore & Ohio tracks to Staten Island will leave the New Jersey Central main track near Elizabeth, N. J., and run thence to the point selected for the building of the bridge. The New Jersey Central tracks are, however, to be used in perpetuity from Bound Brook to Elizabeth, about 20 miles. Payment will be made for all the traffic passing over the line on a *pro rata* basis.

On Aug. 16 it was announced that the arrangements which this company has made to carry through freight between New York and Baltimore by water for the present had fallen through, the Pennsylvania Railroad Co. having notified the Baltimore & New York Transportation Co., which had agreed to carry the freight, that its boats would not be allowed to pass through the Delaware & Raritan Canal if the contract was carried out. This will make it necessary for the company to make other arrangements. Very probably the freight will be shiped to Baltimore by one of the outside freight lines which do not pass through the canal. In this connection it is possible that legal questions may be raised as to the right of the Pennsylvania Railroad Co. to refuse passage through the canal to any boat offering to use it under the ordinary conditions.

Bay Ridge & Annapolis.—This road is completed from Annapolis, Md., to Bay Ridge, a distance of 5 miles. It is intended chiefly for summer and excursion business, Bay Ridge being a pleasure resort for the people of Baltimore and vicinity.

Bellaire, Zanesville & Cincinnati.—The Court has authorized the Receiver to borrow $200,000 for the purpose of putting this road in good condition and purchasing necessary equipment.

Buffalo, New York & Philadelphia.—A bill for foreclosure of the consolidated mortgage was filed by the Trustee in the United States Circuit Court, Aug. 12. This is the final proceeding to carry out the plan of reorganization.

Buffalo, Rochester & Pittsburgh.—The statement to the New York Railroad Commission for the quarter ending June 30 is as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Earnings	$244,962	$297,240	D. $52,278	17.4
Expenses	216,620	211,468	I. 5,152	2.4
Net earnings	$28,342	$85,772	D. $57,430	66 8
Charges	112,822	108,663	I. 4,159	3.8
Deficit	$84,480	$22,891	I. $61,589	267.8

The decrease in earnings this year was largely due to the troubles in the coal trade caused by strikes at the mines.

Cairo, Vincennes & Chicago.—The Receivers make the following statement, covering the two months from May 1 to June 30:

	1886.	1885.	Increas.	P. c.
Earnings	$110.419	$70,679	$39.743	56.2
Expenses	83,942	65,343	18 599	28 5
Net earnings	$26,477	$5,336	$21,111	396.2

Taxes are included in expenses. The earnings for the two months this year were $417 gross and $100 net per mile.

Central, of New Jersey.—It is stated that a traffic contract with the Baltimore & Ohio has been agreed upon, but not yet signed, as noted elsewhere. The details of the contract are not made public, and the officers of this company refuse to make any statement regarding it.

Chicago & Atlantic.—The first-mortgage bondholders met in New York, Aug. 17, holders of $5,846,000 (out of a total of $6,500,000) being present. The meeting instructed the trustees to declare the principal of the mortgage due and to take proceedings to foreclose it. It then appointed James H. Benedict, John J. McCook and George Sherman a purchasing committee. This committee is authorized to consult with holders of other classes of the company's securities.

Chicago, Burlington & Northern.—The first through train on this road was run through Aug. 9, having a number of officers of the company on board. The work of finishing up the track and putting it in order for trains is being pushed as rapidly as possible, and it is expected that the road will be opened for traffic by Oct. 1, although freight trains may be run through before that date.

It is reported that the cost of this road has somewhat exceeded the estimates, and that an issue of second-mortgage or debenture bonds will be made for the purpose of paying off floating debt incurred in construction. It is also said that this issue will be made large enough to pay for more equipment that has been already provided and for building spurs into Galena, Winona and several other towns near, but not through, which the road passes.

Chicago, Burlington & Quincy.—On the extension of the Grand Island Branch of the Burlington & Missouri River line from Grand Island westward track is reported laid for 34 miles west of the late terminus at Ravenna, Neb., the end of the track being 65 miles from Grand Island. This extension is between the Union Pacific and the Fremont, Elkhorn & Missouri Valley lines; it is to run westward at least 200 miles, but it is said that not much over 100 miles will be built this year.

Chicago, Milwaukee & St. Paul.—Grading has been begun on a new branch of this company's line, which is to run from Bristol, Dak., northward to Columbia, southward, through Parks Centre, to Madison. This branch is intended to open up a new and very promising section of country.

Chicago & Northwestern.—Grading has been in progress for some time on the extension of this company's Maple River road from Mapleton, Ia., westward to the Missouri River. Tracklaying was recently begun and the rails are reported down for 8 miles from Mapleton.

On the extension of the branch of the Dakota Division, which now runs from Huron, Dak., northward to Columbia, track has been laid to Houghton, 11½ miles from Columbia and 108½ miles from Huron. Tracklaying is in progress towards Hudson, which is to be the terminus of the road.

Cleveland Belt.—It is proposed to build a railroad around the city of Cleveland, O., from Newburg to Linndale, connecting with all the railroads centring in the city. The road, if built, would be used for transferring freight, and the project also includes the building of extensive docks on the lake.

Consolidated Rolling Stock Co.—This company has been formed by the consolidation of the Bridgeport, the New England, the Housatonic and the Boston & Maine rolling stock companies, organizations which have been in existence for some time, for the purpose of selling and leasing rolling stock under car trust agreements. The stock of the companies was nearly all held in Connecticut, and mainly by the same parties, and the consolidation is intended to simplify the management.

Dayton & Ironton.—The statement for June and the six months to June 30 is as follows:

	June.	Six months.
Earnings	$14.083	$103,632
Expenses	19,575	115,072
Deficit	$5,492	$11,440
Fixed charges	1,710	11,716
Total deficit	$7,202	$23,156

Earnings were reduced and expenses increased by freshets early in the year, which interrupted traffic and caused a considerable expenditure for repairs.

Delaware, Lackawanna & Western.—This company makes the following report to the New York Railroad Commission of the operations of its leased lines in that state for the quarter ending June 30:

	1886.	1885.	Inc. or Dec.	P. c.
Earnings	$1,388 724	$1,128.095	I. $260,629	23.1
Expenses	672,382	538,012	I. 134,370	25 0
Net earnings	$716,342	$590,083	I. $126,259	21.4
Other income		703	D. 703	100.0
Total	$716,342	$590.786	I. $125,556	21.3
Charges	552,749	546,494	I. 6,255	1.1
Surplus	$163,593	$44,292	I. $119,301	269.3

Charges include interest, taxes, track rents and other payments made as part of the rentals under lease agreements.

Denver, Memphis & Atlantic.—The Fitzgerald & Mallory Construction Co., which is building this road, reports that during the month of July track was laid from Conway Springs, Kan., east 7 miles and west 14 miles. Track was also laid from Chetopa, Kan., westward 2 miles, making a total of 23 miles laid during the month.

Duluth, Superior & Michigan.—This company has filed articles of incorporation to build a railroad from Duluth, Minn., eastward to a point on the Montreal River in Ashland County, Wis., a distance of about 125 miles. The route indicated is parallel to the Wisconsin Division of the Northern Pacific.

Fayette & Westmoreland.—This company has filed articles of incorporation to build a branch to Pittsburgh, McKeesport and Youghiogheny, from Morgan Station to Mt. Pleasant, Pa. It is intended to secure some coke traffic.

Flint & Pere Marquette.—The committee representing the common stockholders has issued a circular in which their position is set forth as follows:

"Admitting the terms of this reorganization to have been legal, and in compliance with the legal rights of the common stockholders (which the undersigned distinctly state that they do not admit), it is in such terms of reorganization declared in substance that the net earnings of the company shall be devoted first to the payment of dividends on the preferred stock at the rate of 7 per cent., and that the surplus net income of any year shall be applied to subsequent dividends, and that after five consecutive annual dividends of 7 per cent., or their equivalent, common stock shall be issued to holders of certificates therefor, and that thereafter, after the payment of the 7 per cent. to the preferred stockholders, any surplus of net earnings which may remain shall be paid as dividends ratably to the holders of the common stock to the extent of 7 per cent.

"During three successive years dividends at the rate of 7 per cent. were paid on the preferred stock; for the fourth year but 4 per cent. was paid.

"The undersigned are informed and believe:

"1. That sums have been received which were properly net earnings, and should have been added to net earnings on the company's accounts, and have not been so added.

"2. That net earnings have been diverted from their legitimate object and applied to construction, equipment or other illegimate objects.

"3. That the surplus of net earnings has not been properly carried forward from year to year.

"4. That in other respects the amount of net earnings has been greater than has appeared by the company's accounts, and that the amount has been diminished from what it should rightly be, and that the accounts, if rightly kept, will demonstrate this."

Stockholders are asked to contribute 25 cents per share to pay the expenses of suit to establish their rights in the case.

Fremont, Elkhorn & Missouri Valley.—The grading of the branch of this road from Fremont, Neb., to Lincoln, a distance of 52 miles, is now well advanced. Track has been laid from Fremont southwest 16 miles to the Platte River, and the laying of the rails will be resumed as soon as the bridge over that river is completed. The company has secured grounds for a station, roundhouse and repair shops in Lincoln.

On the Wyoming Extension of this road track is now laid to Lusk, which is 86 miles west of Chadron, Neb., and is some miles over the Wyoming line. The grading is finished to Douglas, which is to be the terminus of the road this year, which is 53 miles beyond Lusk and 139 miles from Chadron, and track-laying is in progress. It is expected that the construction trains will reach Douglas early in September. A branch road has been surveyed to run from Chadron Creek, 50 miles west of Lusk, northward 6 miles, to a point where the company has a large tract of land, and has already commenced the opening of a coal mine.

Haverhill & Lawrence.—A preliminary survey for this line has been completed. The estimated cost of the road is about $200,000, and of this amount $146,000 has been subscribed. The line is intended to run from Haverhill, Mass., southward to Lawrence to connect with the Boston & Lowell branch to the last-named town.

Helena, Boulder & Butte.—This company has been organized to build a railroad from Helena, Mont., to Jefferson, on the Wicks Branch of the Northern Pacific. The engineers are now locating the line, and it is announced that the work of construction will be begun immediately.

Illinois Central.—The Traffic Department reports earnings for the month of July as follows:

	1886.	1885	Inc. or Dec.	P.c.
Ill. and So. Div.	$804.305	$723,007	I. $81.298	11.2
Iowa lines	124,581	134,110	D. 9,529	7.1
Total.	$928,886	$857,117	I. $71,769	8.4

The Land Department reports sales of 2,107 acres for $6,886, and cash collections on land accounts amounting to $9,037 for the month.

Indiana, Alabama & Texas.—This road has been sold to the Louisville & Nashville Railroad Co. It was started as competing line to that road, and last year track was laid from Clarksville, Tenn., north by west to Newstead, Ky., 20 miles, most of it on an old graded roadbed. The sale was made without notice to the local stockholders, and some of them have secured a temporary injunction to prevent the transfer, and will endeavor to have the injunction made permanent, chiefly on the ground that the local subscriptions were made on condition that this should be an independent and competing line.

Joliet, Aurora & Northern.—Tracklaying has been completed on this road, and the first train was run through Aug. 10. Regular trains begin running this week. The line now in operation is from Joliet, Ill., north by west through Plainfield to Aurora, a distance of 23 miles. An extension from Joliet eastward to Valparaiso, Ind., is proposed.

Kansas City, Memphis & Birmingham.—This company has finally bought the Memphis, Birmingham & Atlantic road, which was intended as a parallel line from Memphis to Birmingham, Ala. Negotiations for the purchase were in progress some time ago, but fell through. A Memphis dispatch now announces that the negotiations were recently resumed and the transaction completed. The Memphis, Birmingham & Atlantic is in operation from Memphis to Holly Springs, Miss., and is partially completed for some distance further.

The surveying parties will all be sent east of Tupelo shortly, to complete the location there. On the Birmingham end 65 miles of grade are now under contract and some 6,000 men and 2,000 horses are at work.

Kansas, Colorado & Pacific.—This company has filed articles of incorporation to build a railroad from Topeka, Kan., west to the Colorado line. It is apparently one of the innumerable projects which have been brought into existence by the Kansas laws authorizing local subscriptions.

Lehigh Valley.—A new branch of the Wyoming Division has been completed and opened for business. It extends from Bear Creek Junction, Pa., west to Meadow Run, 12 miles, and is intended to reach a coal district not heretofore tributary to this company's line.

Louisville & Nashville.—The South & North Alabama Railroad Co., which is controlled by this company and forms part of its system, has decided to execute a consolidated mortgage for $10,000,000, the bonds to bear 5 per cent. interest. Of these new consolidated bonds $7,011,000 will be retained to retire the existing bonded debt and the balance used as required to pay for improvements of the road and additions to the equipment. The present debt of the South & North Alabama Co. consists of $391,000 first 8s, due in 1890; $4,620,000 sterling 6s, due in 1903, and $2,000,000 second 6s, due in 1910. The second mortgage bonds are all held by the Louisville & Nashville Co.

This company has purchased the Indiana, Alabama & Texas road, which was started some time ago as a narrow gauge line, to run from Evansville, Ind., to Mobile, and which has some 20 miles of track completed. The transfer is delayed by legal proceedings, as noted elsewhere.

Louisville, New Orleans & Texas.—A meeting was held in New York this week for the purpose of arranging a compromise in the Martin suit. This suit was brought by E. Martin and others, who were formerly holders of stock in the Mississippi Valley & Ship Island and the Vicksburg & Memphis roads. These stockholders sold the charters to the present company and received in return $2,500,000 in stock and second-mortgage bonds of the company. Subsequently they began suit to set aside the first mortgage on the road, claiming that it was executed in violation of the agreement made with them. The suit has not been actively pushed and it is understood that a compromise can be arranged.

Madison & Oshkosh.—This company his filed articles of incorporation to build a railroad from Madison, Wis., by way of Columbus and Beaver Dam, to Oshkosh, a distance of about 85 miles. It is said to be intended as an extension of the Illinois Central's proposed line to Madison.

Manhattan.—The statement of this company, operating the elevated roads in New York City, for the quarter ending June 30, is as follows:

	1886.	1885.	Increase.	P.c.
Earnings	$1,959,052	$1,773,523	185,529	10 4
Expenses	978,691	914,441	64,250	7.0
Net earnings	$980,361	$859,082	121,279	14.1
Other income	17,342	17,284	58	0.3
Total	$997,703	$876,366	$121,337	13 9
Charges	499,265	462,432	36,833	8.0
Surplus	$498,438	$413,934	$74,504	18.0

Charges include interest, rentals and taxes. The surplus was equivalent to 1.92 per cent. on the stock, against 1.59 last year. The dividends paid were 1¼ per cent. in each year.

It is announced that the directors of this company have resolved to reduce the fare on the Third avenue line in New York to 5 cents at all hours of the day from Oct. 1 next. At present they are 5 cents during what are known as the commission hours, morning and evening, and 10 cents at other times. The fare on the Second and Ninth avenue lines was made 5 cents at all hours a short time ago, and it is doubtless the success of that experiment which has induced the present action. There will remain after Oct. 1 only the Sixth avenue line on which 10 cents fare will be charged.

Marquette, Houghton & Ontonagon.—The Marquette *Mining Journal* says: "This company is now engaged in making a very extensive and valuable addition to Marquette's dockage facilities. The dock south of the Marquette & Western ore pier, which has been largely used for lumber, is being extended straight down the shore, the new portion to be 700 ft. in length, making the dock over 1,000 ft. long. A pile driver is now at work there, and about 100 ft. has already been added. The men engaged in the work live in box cars which have been run out on the dock, having their sleeping and eating cars. The work will take some time, but when completed the dock will prove a valuable improvement."

Memphis, Birmingham & Atlantic.—A Memphis dispatch of Aug. 15 reports that an agreement has finally been concluded for the sale of this road to the Kansas City, Springfield & Birmingham Co., which is building a line nearly parallel from Memphis to Birmingham. The Memphis, Birmingham & Atlantic road is in operation form Memphis, Tenn., to Holly Springs, Miss., and considerable work has been done on the extension from Holly Springs to Tupelo. The terms of the sale are not stated.

Michigan & Ohio.—A meeting of the first-mortgage bondholders was held in New York Aug. 18, $2,040,000 of the bonds being represented, out of a total of $2,628,000. A statement was read showing that the indebtedness of the Receiver on Aug. 1 was $614,588, including certificates issued, car trusts, interest and rental of equipment. Against this the Receiver has cash and cash assets amounting to about $35,000. The committee which had examined the road reported that the earnings had increased. In 1884 the expenses exceeded the receipts, in 1885 they were about equal, but for the first half of 1886 there was a small surplus. The committee recommended the building of the proposed branch from Marshall, Mich., northward to the Chippewa River, to secure lumber traffic. The length of this branch will be about 102 miles. A committee consisting of Messrs. Samuel Thomas, Walston H. Brown, John T. Martin, R. K. Wilson, and G. F. Slone, was appointed to report at an adjourned meeting, in regard to a plan for reorganization.

Messrs. George F. Stone, Samuel Thomas and W. H. Brown, the committee representing the bondholders of this company, have issued a call for the meeting of bondholders to be held in New York, Aug. 18. It is reported that at this meeting a plan of reorganization will be presented providing for the exchange of the present first-mortgage bonds for common stock in the new company, and for the issue of new bonds to the amount of $8,000 per mile, the proceeds of which are to be used to put the present road in good order and to purchase equipment, and to build a branch from Marshall, Mich., northward to secure lumber traffic for the road. It is stated that for this proposed branch a considerable amount can be secured in local subscriptions and subsidies.

Midland (Indiana).—Work has been resumed on the extension of this road from the present terminus at Westfield, Ind., west to Lebanon, and the company expects to complete this extension this fall. The road is now in operation from Anderson, Ind., to Westfield, 38 miles.

Minneapolis, Sault Ste. Marie & Atlantic.—Work is being pushed on the extension of this road from its present eastern terminus to the crossing of the Milwaukee, Lake Shore & Western at Rhinelander, Wis., and the track is expected to reach that point early in October.

Minneapolis & Pacific.—Grading is now in progress on this road at different points along the line from Minneapolis to Ramsom, Dak. From Minneapolis westward the grading is finished for some 30 miles and track-laying is now in progress; the rails being reported down for 21 miles.

Missouri Pacific.—Tracklaying on the branch to Lincoln, Neb., was completed last week and regular trains will begin to run about Aug. 25. The station in Lincoln is in course of construction. This branch extends from the Omaha Division at Weeping Water, Neb., westward to Lincoln, the capital of the state, and is 35 miles in length.

Mobile & West Alabama.—This company, which is now the owner of the old Alabama Grand Trunk road, has secured a right of way into the city of Mobile from the City

Council. The Alabama Grand Trunk was completed some 13 years ago from Mobile northward to Jackson, 56 miles, but has not been operated for 7 or 8 years past. In return for the grants of the right of way the new company agrees to have the road rebuilt and in operation to Jackson in six months and to complete an extension to a connection with the Northern Alabama coal fields in 18 months. Surveys are now in progress for an extension from Jackson to Birmingham.

Napanee, Tamworth & Quebec.—At the recent annual meeting of this company it was stated that the road was in excellent condition and that the earnings for the year just closed were 20 per cent. larger than those of the previous year. The road extends from Napanee, Ont., on the Grand Trunk road, to Tanworth, 28 miles.

New York Central & Hudson River.—The statement for the quarter ending June 30 and the nine months of the fiscal year from Oct. 1 to June 30 is as follows:

Quarter:	1886.	1885.	Inc. or Dec.	P. c.
Earnings	$7,570,411	$5,603,634	I. $1,966,777	35.1
Expenses	4,841,131	3,878,863	I. 962,268	24.8
Net earnings	$2,729,280	$1,724,771	I. $1,004,509	58 2
First charges	1,526,000	1,485,000	I. 441,000	29.7
Balance	$803,280	$239 771	I. $563,509	234.8
Dividends	894,283	447,142	I. 447,141	100.0
Deficit	$91,003	$207,371	D. $116,368	56.2
Nine months:	1885-86.	1884-85.		
Earnings	$21,789,214	$18,376,026	I. $3,413,188	18.6
Expenses	13,732,701	11,819,165	I. 1,913,536	16.2
Net earnings	$8,056,513	$6,556,861	I. $1,499,652	22.9
First charges	5,319,000	4,470,000	I. 849,000	19 0
Balance	$2,737,513	$2,086,861	I. $650,652	31.2
Dividends	2,682,849	2,682,849	.....	....
Surplus	$54,664	*$595,088	I. $650,652	....

* Deficit.

The expenses this year were 63.94 per cent. of gross earnings for the quarter and 63 per cent. for the nine months, against 69.22 and 64 32 per cent. last year. The surplus over first charges was equal to 0.90 per cent. on the stock for the quarter and 3.06 per cent. for the nine months, against 0.27 and 3.33 per cent. last year. Dividends paid were 1 per cent. for the quarter and 3 per cent. for the nine months, against 0¼ and 3 per cent. last year. The operations of the West Shore road are included from Dec. 5, 1885.

New York, Lake Erie & Western.—The new train-house of this road in Jersey City is approaching completion. It is on the cite of the old depot, and is a handsome structure of iron and glass, 600 ft. long by 140 ft. wide. There are 8 tracks arranged in pairs. The building is divided into one central section, 60 ft. wide, flanked by two wings each 27 ft. wide.

The new waiting-rooms and offices will be begun just as soon as a suitable foundation can be prepared; the plans were all finished months ago. Soundings to the depth of 190 ft. have been made for a foundation without finding solid bottom, and a plank bed made by laying down several thicknesses of plank, one layer at right angles with the next, and the whole bolted together, may be used as a foundation. The same trouble was experienced at the Pennsylvania terminus, where the plank foundation has proved satisfactory. The new depot will be placed about 20 ft. north of the present structure in order to allow a wider roadway to the Pavonia Ferry. It will be 127 ft. long by 120 ft. wide, three stories high, and will contain a general waiting-room in the centre of the building, 66 ft. by 100. On the south side of the waiting-room will be a restaurant 60 ft. by 24, an express office, and baggage-rooms; on the north side will be a waiting-room for immigrants, toilet-rooms, ladies' waiting-rooms, etc. The second story will be used for offices, and the third story for conductors' and employés' rooms. At the southeast corner of the building be a clock tower 100 ft. high.

New York, Ontario & Western.—The statement for the quarter ending June 30 is as follows:

	1886.	1885.	Inc. or Dec.	P.c.
Earnings	$332,256	$451,256	D. $119,000	26 7
Expenses	272,846	408,219	D. 135,373	33.2
Net earnings	$59,410	$43,037	I. $16 373	38.1
Other income	.....	24,356	D. 24 356	100.0
Total	$59,410	$67,393	D. $7,983	11.9
Charges	27,142	112,357	D. 85,215	76.1
Surplus	$32,268	*$44,964	I. $77,232	.....

* Deficit.

The reduction in earnings is due to the shorter mileage worked. The decrease in the amount of charges is probably largely due to the reduction of rental payments for the use of the West Shore tracks.

Norfolk County.—This road was originally begun by the Norfolk County Lumber Co. as a logging road, and was intended to extend from the Western Branch of the Elizabeth River in Norfolk County, Va., to the Nansemond River. The company's engineer reported, however, that a slight change of the route would carry it through the trucking districts south of Norfolk, where a very considerable business could be secured, while it would still serve the lumber interests of the company. The change was accordingly resolved upon and the route recommended was adopted. The grading of the road is now nearly completed and tracklaying will shortly be begun. At the terminus on the Western Branch the company has excellent facilities for transferring freight to vessels, but the intention is to continue the road along the river to Portsmouth. An extension from the Nansemond River westward to Suffolk is also proposed.

Northern (New Hampshire)—In the New Hampshire Supreme Court last week, the Dow suit, which involves the validity of the lease of this road to the Boston & Lowell Co., was continued until the December term of the court.

Northern Pacific.—This company is building repair shops and a roundhouse at Ellensburg, Wash. Ter., which is to be a division station.

At the tunnel on the Cascade division, work is progressing steadily, although some trouble has been experienced from water. About 1,200 feet of the tunnel are now completed, work going on from both ends. The whole length of the tunnel will be 9,985 ft. No intermediate shafts have been sunk.

Ohio River.—Work is progressing steadily on the extension of this road from Parkersburg, W. Va., to Point Pleasant. The grading is now nearly all done, and good progress has been made with the pile and trestle work. The piers and abutments for the new bridge over the Kanawha at Parkersburg are nearly finished and the erection of the bridge will soon be begun. Tracklaying has been begun at Point Pleasant and 7 miles are reported finished. The work of laying the track will proceed steadily, unless there is some delay from the bridge work.

Omaha & Kansas City.—A preliminary survey of this projected line has been completed from Stromsburg, Neb., through Sutton to York, and the agents of the company are securing the right of way.

Oregon Railway & Navigation Co.—The grading of the company's new branch to Farmington, Ore., is nearly completed. Tracklaying is in progress and 9 miles are reported finished, leaving about 18 miles to be laid to reach Farmington. It is expected that the branch will be in operation early in September.

Pennsylvania.—On the Schuylkill Valley Division the deep cut at Port Clinton was completed last week and track laid through to complete the road to Schuylkill Haven, 14 miles beyond the late terminus at Hamburg, Pa., and 90½ miles from Philadelphia. There remain only 4 miles of track to complete the road to Pottsville, and this will probably be laid in a few days. A large force is now at work ballasting the line. The road from Hamburg to Pottsville is graded for a double track, but only one track is now laid. The contractors are at work on the stations along the line, and the road will probably be through to Pottsville about Sept. 1.

Pittsburgh, Cincinnati & St. Louis.—It is stated that the shops of the Little Miami Division in Cincinnati are shortly to be closed and all the repair work taken to Columbus, where the company is now fitting up extensive shops.

Portland & Ogdensburg.—The Receiver's statement for the quarter ending June 30 is as follows:

Cash balance, April 1	$7,038
Total receipts, three months	169,537
Total	$176 575
Disbursements on all accounts	164,899
Cash balance, June 30	$11,676

Payments included the coupons due Jan. 1 last on the first-mortgage bonds. The receipts were $4,638 in excess of the disbursements for the quarter.

Portland & Willamette Valley.—The grading on this road, which is intended to connect the Oregonian Railway with the city of Portland, is nearly completed from Dundee, Ore., the northern terminus of the Oregonian road, to Elk Rock. Tracklaying has been begun and the rails are reported laid from Dundee to Newburg, 6 miles. Grading is in progress from Elk Rock northward to Portland, and it is expected that the road will be completed by October next.

St. Louis & San Francisco.—On the Kansas City & Southwestern road, now known as the Winfield Branch of this road, track is now laid to South Haven, Kan., 22 miles westward from Arkansas City and 78 miles from the junction with the main line of the Kansas Division at Beaumont. Work is in progress on the extension of the branch from South Haven to Caldwell.

St. Paul, Minneapolis & Manitoba.—Rapid progress has been made with construction on this company's new line in Northern Dakota. The extension of the Devil's Lake branch is now graded to the second crossing of the Mouse River, 140 miles west of Devil's Lake, and the rails are laid for 80 miles. On the Cando Branch the grading is completed for 16 miles, but no rails have been laid as yet. On the Bottineau branch grading is completed for 45 miles and tracklaying has been begun. The main force is at present employed on the main line, the intention being, it is stated, to reach the Missouri River, 200 miles west of Devil's Lake, before the cold weather sets in.

The following new stations have been opened for business, the distances given being from Devil's Lake: Grand Harbor, 7.12; Church's Ferry, 18.87; Leeds, 30.31; York, 36.56; Knox, 42.60; Pleasant Lake, 48.06; Rugby Junction, 56.93 miles.

Savannah & Tybee.—Work on the grading of this road was begun at Deptford near Savannah, Ga., Aug. 9, and a considerable force is to be put on at once. The beginning of the work was marked with some ceremony, and the occasion was of interest from the fact that the day was the 50th anniversary of the breaking of ground for the Central Railroad of Georgia near Savannah. The first spade full of dirt on the new road was thrown up by Thomas Purse, a young man who is grandson of the Hon. Thomas Purse who performed the ceremony of breaking ground for the Central road

Savannah Valley.—Track on this road is now laid to the terminus at Anderson, S. C., on the Blue Ridge branch on the Columbia & Greenville road. The new terminus is 58½ miles from the starting point at McCormack, on the Augusta & Knoxville road. It runs through a good country and is expected to develop a considerable local traffic and to extend the business connection of the city of Augusta with the South Carolina up-country.

Seattle, Lake Shore & Eastern.—A concern known as the Puget Sound Construction Co. has taken the contract to build this road. The total amount of securities to be issued is $1,500 in stock and $25,000 in 6 per cent. first-mortgage bonds per mile of road. The contractor has agreed to build the first division of 40 miles from Seattle, Wash. Ter., to the coal mines in Squak Valley for $20,000 per mile in bonds and $10,000 in stock. For the balance of the projected main line and branches, about 500 miles in all, the price paid is to be $25,000 per mile in bonds and $12,000 in stock. The Puget Sound Construction Co. now asks for subscriptions to $500,000 of its own stock, and states in its prospectus that the subscribers will receive for each $10,000 paid in $15,000 in bonds and $8,000 in stock of the railroad company, and will also have the option of the first interest in subscriptions for further extensions

Skookum Bay.—This road is now completed from Little Skookum, Wash. Ter., westward 7 miles. The starting point is on one of the southern arms of Puget Sound. The road is at present used as a logging road, but it is built as a permanent line and is to be gradually extended through Gray's Harbor on the Pacific coast.

Southern Pacific.—Track on the extension of the Northern Division from Soledad, Cal., is now completed to San Barnabé, 20 miles south by east from the late terminus at San Lorenzo and 45 miles from Soledad. There remains about 20 miles to reach San Miguel, which includes some difficult work. The construction force is now employed on the rock cutting along the Salinas River.

Sullivan County.—Surveys have been made for a short branch of this road, from Claremont, N. H., to Claremont village, and work will soon be begun.

Transcontinental Bridge Co.—This company has been organized to build a bridge over the Mississippi River at Natchez, Miss. The bridge is intended to be part of a projected line from New Orleans to Ft. Scott, which is likely to remain upon paper for some time.

Troy, Saratoga & Northern.—This company has been formed by consolidation of the Saratoga Lake and the Hoosac Tunnel & Saratoga companies, and the consolidation has been ratified by the stockholders of both companies. The Saratoga Lake road extends from Ketchum, N. Y., to Saratoga Springs, 10 miles. The Hoosac Tunnel & Saratoga road extends from Saratoga Junction to Ketchum, 7½ miles, with a branch 8 miles long to Schuylerville. It is proposed to extend the consolidated road from Schuylerville, through Waterford, to Troy. The lines of both companies have always been leased to and operated by the Boston, Hoosac Tunnel & Western Co., forming the Saratoga Branch of that road.

Union Pacific.—The land sales in July were 19,125 acres for $101,480. For the seven months to July 31 the land sales were:

	Acres.	Amount.
Union Division	146,495	$178,903
Kansas Division	138,765	767,364
Total	285,260	$946,267

As compared with the corresponding period of last year, there was a decrease of 50.8 per cent. in acres sold, and of 36.7 per cent. in the amount.

Wabash, St. Louis & Pacific.—Messrs. John N. A. Griswold, Thomas Hillhouse and Charles E. Fleming give notice that they have been requested by a number of holders of second mortgage bonds on the Wabash line east of the Mississippi to act as a committee in their behalf. They are preparing agreements, authorizing them to take decided action, and will submit them for the approval of bondholders shortly.

The committee representing the bondholders of the Omaha Division give notice that a majority of the bondholders have assented to the agreement of June 9 last, and all holders of bonds desiring to join in the agreement will be required to deposit their bonds with the United States Trust Co. in New York by Sept. 15 next, in order that the committee may be enabled to act promptly.

A meeting of the bondholders was held in New York, Aug. 12, to hear the plan proposed by the committee appointed at a previous meeting, held on July 8 last. Mr. H. V. Poor presented the committee's report, which stated that the Court will not permit the road to be surrendered to the purchasing committee until charges amounting to about $4,200,000 were paid. In answer to question from bondholders, Mr. James F. Joy, for the Purchasing Committee, said that over $2,000,000 of it existed when the Receivers took possession, and that it has been increased by the necessity of running a number of the lines at a loss. The plan of reorganization proposed is, that the new company should issue stock to the stockholders in the old company on the payment by them of an assessment of $8 per share on the preferred and 6 on common stock. The plan further provides that the new company shall issue $30,000,000 in 6 per cent. debenture bonds, subject to the lien of all the first and second divisional bonds. Of these new bonds $16,000,000 are to be exchanged for the general mortgage bonds, $10,000,000 for the collateral trust bonds, $4,000,000 to be issued for the assessments on the stock, $3,500,000 to be used in the settlement of floating debts, and the balance reserved for future needs. The holders of first-mortgage bonds on the various divisions are to agree to accept 5 per cent. interest. The Committee reported that, in their opinion, the bondholders should accept this proposition, as further litigation would result in the complete breaking up of the system. After some discussion the report of the committee was approved by a majority of those present.

Wilmington & Weldon.—The tracklayers working northeast from Fayetteville, N. C., on this company's new Wilson Cut-off, have reached Rhodes, 14 miles from Fayetteville. A large part of the grading from Wilson to Fayetteville is now completed.

ANNUAL REPORTS.

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Scioto Valley.

This company owns a line from Columbus, O., through Portsmouth to Petersburg, 131 miles. Included in this are 8 miles

of track, the use of which is leased from other companies. The road is held by a Receiver, who has recently made a statement for the year ending May 31 last.

The funded debt includes $1,294,000 first 7s; $283,000 second 7s; $553,000 consolidated 7s and $82,000 equipment 7s; a total of $2,212,000. Interest is in default from Jan. 1, 1885. The total funded debt is $17,984 per mile of road owned; the yearly interest charge is $1,259 per mile.

The earnings for the year were as follows:

Earnings ($4 523 per mile)	$592,510
Expenses (76.8 per cent.)	455,306
Net earnings ($1,047 per mile)	$137,204
Improvements and betterments	93,558
Balance	$43,646

The net earnings, before deducting betterments, were sufficient to pay interest on the first-mortgage bonds and leave a surplus of $46,624. If the betterments be deducted, however, the remaining surplus is only equal to 3.37 per cent. on the first-mortgage bonds, or a little less than half the interest accruing.

Michigan & Ohio.

This company owns a line from Dundee, Mich., to Allegan 133 miles, and uses the Toledo, Ann Arbor & North Michigan tracks from Dundee to Toledo, O., 23 miles, making a total of 156 miles worked. The road is operated by a receiver, pending foreclosure proceedings. The following statements for the year ending Dec. 31 were presented at a meeting of the bondholders this week.

The funded debt consists of $2,628,000 first-mortgage 6s. The Receiver's debts, consisting of certificates issued, car-trusts, etc., amount to $614,588; his cash assets are $35,000.

The earnings for the year were as follows:

	1886.	1885	Inc. or Dec.	P. c.
Freight	$117,125	$66.180	I. $50,945	77 2
Passengers	52,030	44,942	I. 7 088	15.7
Other	22,879	27,625	D. 4.746	17.0
Total	$192,034	$138,747	I. $53,287	38.4
Expenses	188.514	188,989	D. 475	0.3
Net earnings	$3.520	*$50,242	I. $53,762	
Gross earn per mile	1,231	889	I. 342	38.4
Net earnings per mile	23			
Per cent. of expenses	98.8	136.2	D. 37.4	

*Deficit.

For the half year to June 30 this year the gross earnings were $100,226, expenses $97,482; net earnings $2,744. The expenses as given above include track rentals. The earnings have been very light.

Cincinnati, Indianapolis, St. Louis & Chicago.

This company's fiscal year closes June 30. The full annual report will not be ready for some weeks yet, but a preliminary statement has been published, showing very favorable results for the year. There was no change in mileage worked.

The statement of income is as follows:

	1885-86.	1884-85.	Inc. or Dec.	P.c
Earnings	$2 426.412	$2,494,794	D. $68 382	2.7
Expenses	1,480.431	1,660,180	D. 179,689	10.8
Net earnings	$945,921	$834.614	I $111,307	13.3
Interest, etc., received.	100,521	101,065	D. 544	0 5
Total	$1.046,442	$935,679	I. $110 763	11.9
Interest, etc	693,902	653,528	I. 40,374	6.2
Surplus	$352,540	$282,151	I. $70,389	24 9

The surplus last year was equivalent to 5 per cent. on the stock. Three quarterly dividends of 1 per cent. each were paid, amounting to $210,000 and leaving a balance of $142,540. In the preceding year the surplus was applied to improvements of road and payment of floating debt.

St. Louis, Alton & Terre Haute.

This company operates a line from East St. Louis, Ill., to Eldorado, 121 miles, with a branch from Belleville to East Carondelet, 17 3 miles; 138.3 miles in all. This line is made up of the Belleville Branch, owned, East St. Louis to Belleville, 14.4; the Belleville & Southern Illinois, Belleville to Du Quoin, 56.4; the Belleville & Eldorado, Du Quoin to Eldorado, 50.2, and the Belleville & Carondelet, Belleville to East Carondelet, 17.3 miles. The report is for the year ending Dec. 31.

The company also owns a main line from East St. Louis to Terre Haute, Ind., 189, with a branch to Alton, Ill., 4.2, this line of 193 2 miles being leased to the Cleveland, Columbus, Cincinnati & Indianapolis Co. as owner and lessee of the Indianapolis & St. Louis road.

The equipment of the line worked includes 18 locomotives 10 passenger, 4 combination, 2 mail and 2 baggage cars; 210 box, 15 refrigerator, 25 stock, 600 coal and 41 flat cars.

The general account is as follows, condensed:

Common stock		$2 300.000
Preferred stock		2,468.400
Funded debt		8,057 000
Sinking fund		655.000
Accrued interest, etc		337.691
Income account, balance		695,693
Total		$14,513,784
Capital stock account	$13 125,400	
Trustees sinking fund	655.000	
Ind. & St. Louis Co., lease accounts	569,914	
Belleville Branch	8,82 t	
Bank of North America	154 647	
		14,513.784

The funded debt includes $2,200,000 first-mortgage bonds; $2,800,000 second-mortgage preferred bonds; $1,700,000 second-mortgage income bonds, and $1,357,000 dividend bonds.

The earnings of the line operated for the year were as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Freight	$355.254	$359.192	D. $3,938	1.1
Coal	210.442	161,183	I. 49,259	30 6
Passengers	147.474	168,722	D. 21 248	12.6
Mail and express	29,585	30,010	D. 425	1.4
Miscellaneous	23,561	22,043	I. 1,518	6.9
Total	$766,316	$741.150	I. $25.166	3.4
Expenses	397,348	406,160	D. 8,812	2.2
Net earnings	$368,968	$334 990	I. $33,978	10 1
Gross earn per mile	5,541	5,358	I. 183	3 4
Net " " "	2,668	2,422	I. 248	10.1
Per cent. of expenses	51.9	54 8	D. 2 9	

The rental of the leased roads was $203,381, leaving a surplus for the line worked of $165,587. This surplus was made up as follows: Belleville Branch, separate earnings, $66,338; earnings from leased line business, $57,658, leased lines earnings over expenses and rentals, $41,591; total, $165,587.

The traffic of the line operated for the year was as follows:

	1885.	1884.	Inc. or Dec	P. c.
Passengers carried	2?4,577	255,611	D. 31.034	12 1
Passenger-miles	6,624 391	7,007,196	D. 382.805	5.5
Tons freight carried	3?9,384	372,632	I. 6,752	1.8
Freight ton-miles	24,385,363	23,329,109	I. 1,056,?54	4.5
Tons coal carried	431,158	380,3?4	I. 51,824	13.6
Coal ton-miles	12,159,616	10,912,453	I. 1,247,163	11.5
Average rate:				
Per passenger-mile	2.230 cts.	2.410 cts.	D. 0.180 ct.	7.5
Per freight ton mile	1.457 "	1.539 "	D. 0.082 "	5.3
Per coal ton-mile	1.731 "	1.477 "	I. 0.254 "	17.2

Through business exchanged last year with the Illinois Central at Du Quoin amounted to 288,053 tons. The earnings per train mile were: Passenger, $0.89; freight, $2.42; coal, $5.25; average of all, $2.14; expenses, $1.11; net earnings, $1.03. The rate per ton-mile on through freight was 1.092; local, 2.621 cents.

The income account is as follows, in a condensed form:

Net earnings road operated		$368,968
Rental of main line		450.000
Interest received, etc		8,127
Total		$827,095
Rental of leased lines	$203,381	
Interest on bonds	469.000	
Back interest, etc., equipment bonds	23,062	
Main line expenses	9,903	
New equipment	3 760	
Dividends on preferred stock, 7 per cent	172,788	
		881,894
Excess of payments		54 799
Surplus from previous year		750.492
Surplus, Dec. 31, 1885		$695,693

The sinking fund trustees report $636,000 bonds and $159,729 cash on hand. They have purchased no bonds, as none can be bought at or under 110, the limit set by the terms of the trust.

Renewals included 332 tons of steel rails and 40,884 new ties; three spans, 314 ft. in all, of new iron bridge; a new water tank and the rebuilding of the East St. Louis shops, which were destroyed by fire in December, 1884.

The decrease in local freight was due to failure of the wheat crop along the line. The Vice-President's report says:

"The nominal rates on coal that prevailed during a portion of the previous year preclude any satisfactory comparison with the business of that year. The rates established Oct. 11, 1884, have been maintained; but in harmony with the almost uniform result of rate wars, the restored rate was materially less than the rate that prevailed prior to the destruction of the former agreement.

"The volume of through business has continued to increase. The revenue from it was 8 per cent. more than that of the previous year. This has been accomplished by persistent effort and much expense. The business of the southern states is gradually increasing, but there is more than a proportionate increase of competition, hence it is difficult to secure remunerative rates without some sort of confederation between competing lines.

"The negotiations for the lease of the St. Louis & Cairo narrow-gauge road by the Mobile & Ohio Railroad Co. were about consummated at the close of the year, and the leased line, extending from Cairo to East St. Louis, will be changed to standard gauge, and operated as part of the Mobile & Ohio system.

"This proposed change of gauge will somewhat increase our local competition between St. Louis and Cairo, and also afford another competitor out of St. Louis for southern traffic."

The gross earnings of the main line are reported by the lessee as follows:

	1885.	1884.	Inc. or Dec.	P.c.
Freight	$835.013	$886 250	D. $51,237	5.8
Passengers	316.900	338.441	D. 21,541	6.4
Mail and express	56.827	48.596	I. 8,231	16.8
Miscellaneous	60,972	50,638	I. 10,334	20.4
Total	$1,269,712	$1,323,925	D. $54.213	4.1
Per mile of road	6,572	6,853	D. 281	4.1

The minimum rental provided for by the lease is $450,000. This was promptly paid by the lessee. The report says: "The lessee companies have also complied with both the letter and spirit of the lease in the improvement of the physical condition of the plant. It now ranks as first class in every particular."

Allegheny Valley.

This company works the River Division, including the main line from Pittsburgh to Oil City, 132 miles, and the Plum Creek Branch, 7 miles; the Low Grade Division, from Red Bank, Pa., to Driftwood, 110 miles, and the Sligo Branch, 10 miles; a total of 259 miles. There was no change in mileage last year. Since May 2, 1884, the road has been in possession of Receivers, but the company's report presents full statements for the year 1885.

The equipment includes 71 locomotives; 31 passenger, 11 combination and 8 baggage and mail cars; 297 box, 1 stock, 1,476 gondola, 32 flat, 256 boiler tank and 32 caboose cars; 1 directors' and 1 pay car, 4 wrecking, 1 fire extinguisher and 15 boarding cars.

The general account, condensed, is as follows:

Stock		$2,166.500
Mortgage bonds		16,400.000
Real estate bonds and mortgages		123,944
Income bonds		9,722.300
Guaranteed coupons bought by Pa. R. R. Co		5,732,710
Interest accrued		438,484
Other accounts		117,732
Total		$34,201,670
Road and property	$24,049 540	
Materials	86.294	
Accounts and balances	102,844	
Cash	527,754	
Unavailable asse's: bad accounts, etc	441.925	
Profit and loss, debit balance	8,993,313	
		34,201,670

The mortgage debt consists of $4,000,000 River Division 7.3 per cent. first-mortgage bonds; $10,000,0000 Low Grade Division 7 per cent. first-mortgage bonds, and $2,400,000 Low Grade Division 5 per cent. second-mortgage bonds. Of the income bonds, $6,087,000 are held by railroad companies and $3,635,300 by individuals.

The earnings for the year were as follows:

	1885.	1884.	Inc. or Dec.	P.c.
Freight	$1,286,037	$1,572,039	D. $286,002	18.2
Passengers	427,473	483.372	D. 55,899	11.6
Mail and express	42,106	42,231	D. 125	0.3
Miscellaneous	24,517	16,241	I. 8,276	51 6
Total	$1,780,133	$2,113,883	D. $333,750	15.8
Expenses	1,108,990	1,292,564	D. 183,565	14.2
Net earnings	$671,134	$821 319	D. 150,185	18.3
Gross earn. per mile	6,873	8,162	D. 1,289	15.8
Net " " "	2.591	3.171	D. 580	18.3
Per cent. of expenses	62.3	61 2	I. 1.1	

The earnings per mile of the several divisions were: River Division, $9,335 gross and $3,715 net; Low Grade, $4,352 gross and $1,426 net; Sligo Branch, $396 gross. The proportion of earnings to expenses was: River Division, 60.2; Low Grade, 67.3; Sligo Branch, 151.6 per cent.

The expenses were divided as follows:

	1885. Amount.	P. c.	1884. Amount.	P. c.
Conducting transportation	$335,833	18 9	$386,402	18.3
Motive power	258,087	14.5	323.006	15.3
Maintenance of cars	190,935	10.7	175,488	.8 3
Maintenance of way	250,950	14.1	328.142	15 5
General expenses	73,194	4.1	79,526	3.8
Total	$1.108,099	62.3	$1,292,564	61.2

The interest accruing on the funded debt (not including income bonds) was $1,124,653, or $453,519 in excess of the net earnings for the year. Interest actually paid is noted below. The coupons on the Low Grade firsts are bought and held by the Pennsylvania Railroad Co, which guarantees the bonds.

Actual payments from net earnings were as follows:

Net earnings, as above		$671,134
Interest on River Division firsts	$292,000	
" Low Grade seconds	122,500	
" real estate liens	8,136	
" car trusts	4,517	
Installment on Low Grade second mortgage	100,000	
		527,153
Balance		$143,981

The second mortgage on the Low Grade Division is held by the state of Pennsylvania, and the terms of the loan require the payment of $100,000 yearly on the principal.

The traffic for the year was as follows:

	1885.	1884.	Inc. or Dec.	P.c.
Pass. train-miles	622,761	650,058	D. 27,297	4.2
Freight " "	800,152	978 390	D. 178,238	18.2
Total " "	1,493,243	1,707,613	D. 214,370	12.5
Pass. car-miles	1,901,536	2 048,491	D. 144.955	14.1
Freight " "	16,244,706	19,870,417	D. 3,625.711	18.2
Passengers carried	966.557	985,591	D. 19,034	1.9
Passenger-miles	16,571,359	17,169,870	D. 598.511	3.5
Tons freight car	2,404.282	2,751,154	D. 346 872	12.6
Ton-miles	138,847,110	163,275,475	D. 24,428,355	14.9
Average train load:				
Passengers, No	26.8	26.4	I. 0.4	1.5
Freight, tons	173 5	166.9	I. 6.6	4.0

The average passenger journey last year was 17.1 miles; the average freight haul 57.8 miles. Of the freight cars hauled on the River Division, 40.1 per cent., and on the Low Grade Division, 43.5 per cent., were empty cars.

The average receipt and cost per unit of traffic were, in cents:

	1885. Receipt.	Cost	Net.	1884. Receipt.	Cost.	Net.
Per passenger-mile	2 579	1 825	0.754	2.815	1.867	0.948
Per ton mile	0.922	0.580	0.342	0.962	0.595	0.367

The average rate last year on through freight was 0.623, and on local 0.963 cent per ton-mile. The local freight includes a large amount of coal and other coarse freights necessarily taken at low rates. In 1872 the average rate per ton-mile was 2.58 cents, but since that time there has been a steady decrease.

During the year 682 tons of steel rails and 96,517 new ties were used in renewals. The usual repairs and renewals of bridges and trestles were made. The track was raised above the reach of floods at Rosston and the new outbound freight tracks in Pittsburgh completed. The necessary repairs of stations and other buildings were made and the property kept in good condition.

Cleveland, Lorain & Wheeling.

This company owns a line from Lorain, O., to West Wheeling, 157.5 miles. The report is for the year ending Dec. 31 last.

The road was originally the Lake Shore & Tuscarawas Valley, and was sold under foreclosure in 1875 and reorganized as the Cleveland, Tuscarawas Valley & Wheeling. In 1883 it was again sold under foreclosure and the present company organized.

It is chiefly a coal road, built to give the coal mines of the Tuscarawas Valley connections with Lake Erie and the Ohio River.

The general account, condensed, is as follows:

Common stock		$1,000.000
Preferred stock		4,600,000
Funded debt		700.000
Bills and accounts payable		34.272
Profit and loss		437,468
Total		$6.771,740
Road and equipment	$6,486,556	
Supplies	32.430	
Accounts and balances	225.633	
Cash	27,121	
		6,771,740

The funded debt consists of $700,000 first-mortgage 7s. The company has no other debt beyond the usual current balances.

The earnings of the year were as follows:

	1885.	1884.	Inc. or Dec.	P.c.
Freight	$626,479	$717,104	D. $90,625	12.6
Passengers	110.049	122,961	D. 12,912	10.5
Mail and express	17,272	16,459	I. 813	5.0
Miscellaneous	1,648	1,567	I. 81	5.1
Total	$755 448	$858,091	D. $102,643	12.0
Expenses	543,337	603,171	D. 59,834	9.9
Net earnings	$212.111	$254,920	D. $42,809	16.8
Gross earn per mile	4,796	5,448	D. 652	12.0
Net " " "	1.347	1,618	D. 271	16.8
Per cent of expenses	70.9	70.3	I. 0.6	

Taxes are included in expenses; they amounted last year to $23,301, or 2.1 per cent., of gross earnings.

Interest on the bonds was $49,000, which would leave a balance of $163,111 for the year. The report gives no statement of the disposition of net earnings.

The train mileage for the year was as follows:

	1885.	1884.	Inc. or Dec.	P. c
Passenger	248,856	248 255	I. 601	0.2
Freight and switching	563.837	602,662	D. 38,825	6.4
Service	37,305	53,220	D. 15 ?15	30.0
Total	849,998	904,137	D. 54,139	6 0

Locomotive service cost 12.42 cents per mile run. No other traffic figures are given in the report.

Renewals included 10.80 miles laid with steel rails; 41,779 new ties; 0.82 mile of new sidings; 997 ft. of trestle filled in; a new Howe-truss bridge 332 ft. long; 2.50 miles ballasted; 26 miles fenced and the docks at Lorain rebuilt.

The report says: "The material condition of the road and equipment was well maintained; the bridges especially were much improved by renewals. All extraordinary expenditures of this character were, as usual, charged to the operating accounts.

"This railroad was no exception to the rule of active competition and consequent low rates for transportation, and, under all the circumstances, may be regarded as fortunate to be free from current debt.

"The Pittsburgh & Wheeling Coal Co., in which you are all interested ratably with your ownership of the shares of this company, is also free from debt."